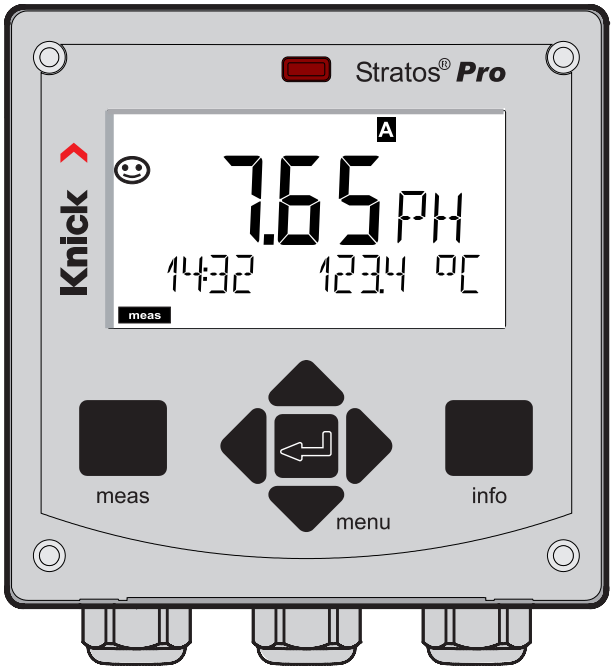
Stratos® Pro A2... PH

User Manual



Latest Product Information:

www.knick.de

80973

Knick

Warranty. Disposal. About This Manual.

Warranty

Defects occurring within 3 years from delivery date shall be remedied free of charge at our plant (carriage and insurance paid by sender).
Sensors, fittings and accessories: 1 year.
Subject to change without notice.

Return of products under warranty

Please contact our Service Team before returning a defective device.
Ship the cleaned device to the address you have been given.
If the device has been in contact with process fluids, it must be de-contaminated/disinfected before shipment. In that case, please attach a corresponding certificate, for the health and safety of our service personnel.

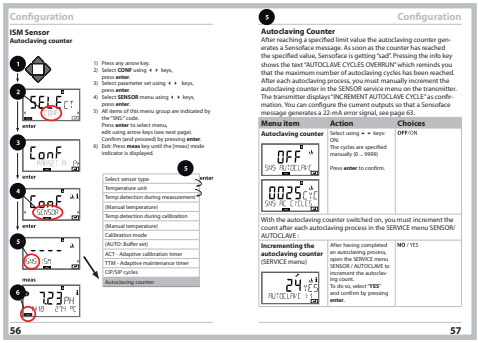
Disposal

Please observe the applicable local or national regulations concerning the disposal of "waste electrical and electronic equipment".

About this manual:

This manual is intended as a reference guide to your device –
You don't have to read the book from front to back.
Take a look at the ***Table of Contents*** or the ***Index*** to find the function you are interested in. Each topic is explained on a double-page spread with step-by-step instructions on how to configure the desired function. Clearly legible page numbers and headlines help you to quickly find the information:

Left page:
How do I get to the function



Right page:
Which settings are provided for this function

Specific Test Report

CD-ROM

Complete documentation:

- User manuals
- Safety instructions
- Certificates
- Short instructions

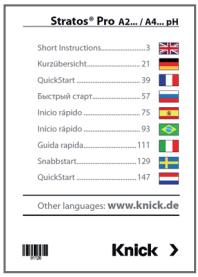
Safety Information

In official EU languages and others.

- EC Declarations of Conformity

Certificates

- IECEx
- ATEX
- FM
- CSA
- NEPSI
- GOST



Short Instructions

First steps after installation:

- Operation
- Menu structure
- Calibration
- Error messages and recommended actions

In German, English, French, Russian, Spanish, Portuguese, Italian, Swedish and Dutch.
More languages on CD-ROM and on our website: www.knick.de

Contents

Documents Supplied **3**

Introduction **7**
Intended Use 7

Safety Information **10**

Overview of Stratos Pro A2... PH **12**

Assembly **13**
Package Contents 13
Mounting Plan, Dimensions 14
Pipe Mounting, Protective Hood 15
Panel Mounting 16

Installation **17**
Installation Instructions 17
Rating Plates / Terminal Assignments 18
Wiring of Stratos Pro A2... PH 19
Wiring Examples 21

User Interface, Keypad **32**

Display **33**
Signal colors (display backlighting) 33
Measuring Mode 34
Selecting the Mode / Entering Values 35

Display in Measuring Mode **36**

Color-Coded User Interface **37**

Operating Modes **38**
Menu Structure of Modes and Functions 39
HOLD Mode 41
Alarm 42
Alarm and HOLD Messages 43

Configuration **44**
Menu Structure of Configuration 44
Manual switchover of parameter sets A/B 46
Parameter Sets (Original for Copy) 52

Sensor 54
Current Output 1 70
Current Output 2 78
Temperature Compensation 80
CONTROL Input 84
Alarm Settings 88
Time and Date 92
Tag Number 92

Digital Sensors 94
Memosens Sensors: Calibration and Maintenance in the Lab 94
Memosens Sensors: Configuring the Device 95
Replacing a Sensor 96

Calibration 98
Selecting a Calibration Mode 99
Zero Adjustment (ISFET) 100
Automatic Calibration (Calimatic) 102
Manual Calibration with Buffer Entry 104
Data Entry of Premeasured Sensors 106
Product Calibration (pH) 108
ORP (Redox) Calibration 110
Temp Probe Adjustment 112

Measurement 113

Diagnostics 114

Service 119

Operating States 122

A2...X: Supply Units and Connection 123

Product Line and Accessories 124

Specifications 125

Buffer Tables 133
-U1- Specifiable Buffer Set 143

Contents

Error Handling **146**

Error Messages **147**

HART: Typical Applications **150**

Sensoface **151**

FDA 21 CFR Part 11 ..... **154**
Electronic Signature – Passcodes 154
Audit Trail 154

Glossary **155**

Index **160**
Trademarks 171

Passcodes **172**

Intended Use

Stratos Pro A2... PH is used for pH/mV, ORP and temperature measurement in industry, environment, food processing and sewage treatment.

Enclosure and mounting possibilities

- The sturdy molded enclosure is rated IP 67/NEMA 4X for outdoor use. It is made of glass-reinforced PBT / PC and measures 148 mm x 148 mm x 117 mm (H x W x D).
  It is provided with knockouts to allow:
- wall mounting (with sealing plugs to seal the enclosure), see page 14
- post/pipe mounting (Ø 40 … 60 mm, ☐ 30 … 45 mm) see page 15
- panel mounting (138 mm x 138 mm cutout to DIN 43700), see page 16

Weather protector (accessory)

The weather protector, which is available as accessory, provides additional protection against direct weather exposure and mechanical damage, see page 15.

Connection of sensors, cable glands

For connecting the cables, the enclosure provides

- 3 knockouts for cable glands M20x1.5
- 2 knockouts for NPT 1/2" or rigid metallic conduit

For quasi-stationary installations with Memosens sensors, we recommend using the M12 device socket (accessory ZU 0822) instead of a cable gland – it allows simple replacement of the sensor cable without opening the device.

Sensors

The device has been designed for application with commercially available sensors with a nominal zero point at pH 7, ISFET sensors or digital sensors. (It can be easily retrofitted for Memosens sensors.)

Display
Plain-text messages in a large, backlit LC display allow intuitive operation. You can specify which values are to be displayed in standard measuring mode ("Main Display", see page 36).

Color-coded user interface
The colored display backlighting signals different operating states (e.g. alarm: red, HOLD mode: orange, see page 37).

Diagnostics functions
“Sensocheck“ automatically monitors the glass and reference electrodes; and the “Sensoface“ function clearly indicates the sensor condition, see page 151.

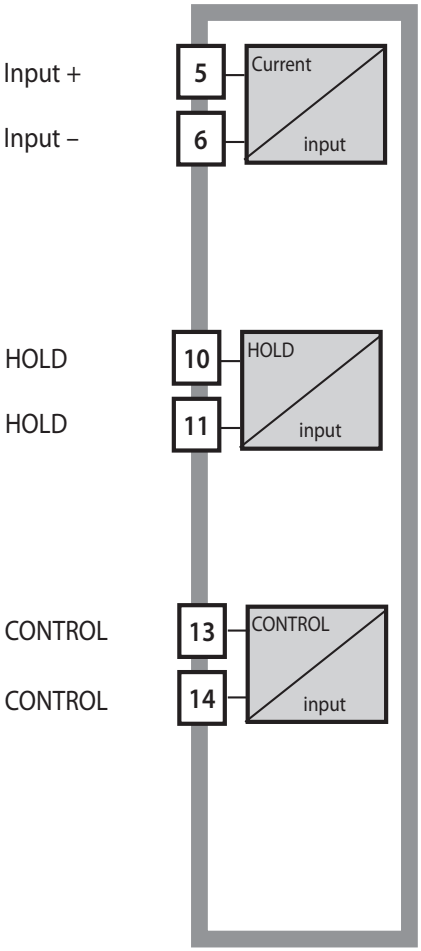
Data logger
The internal logbook (TAN SW-A002) can handle up to 100 entries – up to 200 with AuditTrail (TAN SW-A003), see page 117.

2 parameter sets A, B
The device provides two parameter sets which can be switched manually or via a control input for different process adaptations or different process conditions.
For overview of parameter sets (table for copy), see page 52.

Password protection
Password protection (passcodes) for granting access rights during operation can be configured, see page 121.

Automatic calibration with Calimatic
You can choose from the most commonly used buffer solutions, see page 133.
An individual buffer set can also be entered, see page 143.

Control inputs



I input
The analog (0) 4 ... 20 mA current input can be used for external temperature compensation (TAN required).
See page 82.

HOLD
(floating digital control input)
The HOLD input can be used for external activation of the HOLD mode, see page 42.

CONTROL
(floating digital control input)
The CONTROL input can be used either for parameter set selection (A/B) or for flow monitoring, see page 84.

Signal outputs

The device provides two current outputs (for transmission of measured value and temperature, for example).

Options

Additional functions can be activated by entering a TAN (page 121).

Safety Information

Safety Information

Be sure to read and observe the following instructions!

The device has been manufactured using state of the art technology and it complies with applicable safety regulations.
When operating the device, certain conditions may nevertheless lead to danger for the operator or damage to the device.

See also the following documents (page 3):

- "Safety Instructions"
- "Certificates"

⚠ CAUTION!

Commissioning must only be performed by trained personnel authorized by the operating company! Whenever it is likely that protection has been impaired, the device shall be made inoperative and secured against unintended operation.
The protection is likely to be impaired if, for example:

- the device shows visible damage
- the device fails to perform the intended measurements
- after prolonged storage at temperatures below –30 °C or above 70 °C
- after severe transport stresses

Before recommissioning the device, a professional routine test must be performed. This test must be carried out at the manufacturer's factory.

Please note:
Before commissioning you must prove that the device may be connected with other equipment.

Information for installation in hazardous locations (Stratos Pro A2...X PH)

- Be sure to observe the stipulations of EN 60079-10 / EN 60079-14 or the corresponding local regulations during installation and commissioning. See also separate "Safety Instructions" document.

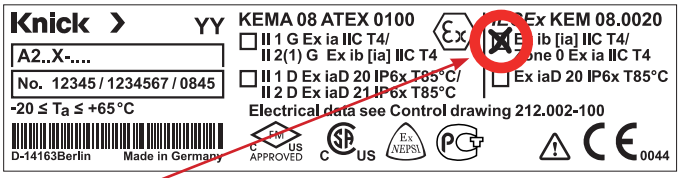
Approvals for application in hazardous locations: (Stratos Pro A2...X PH)

IECEx, ATEX, FM, CSA, NEPSI, KOSHA and GOST
(see "Certificates" document).

Memosens Ex wiring	U_o (V)	I_o (mA)	P_o (mW)	C_i (µH)	L_i (µH)
Stratos Pro A2...X / A2...B	5	124	155	10.6	0

Important Note:
The operator must indicate the type of protection!

When the device provides different types of protection, the operator must specify the applied type of protection during installation.
To do so, use the checkboxes on the rating plate:


Knick
YY
A2..X-....
No. 12345 / 1234567 / 0845
-20 ≤ Ta ≤ +65°C
D-14163Berlin
Made in Germany
KEMA 08 ATEX 0100
II 1 G Ex ia IIC T4/
II 2(1) G Ex ib [ia] IIC T4
II 1 D Ex iaD 20 IP6x T85°C/
II 2 D Ex iaD 21 IP6x T85°C
Ex KEM 08.0020
ib [ia] IIC T4/
one 0 Ex ia IIC T4
Ex iaD 20 IP6x T85°C
Electrical data see Control drawing 212.002-100
APPROVED
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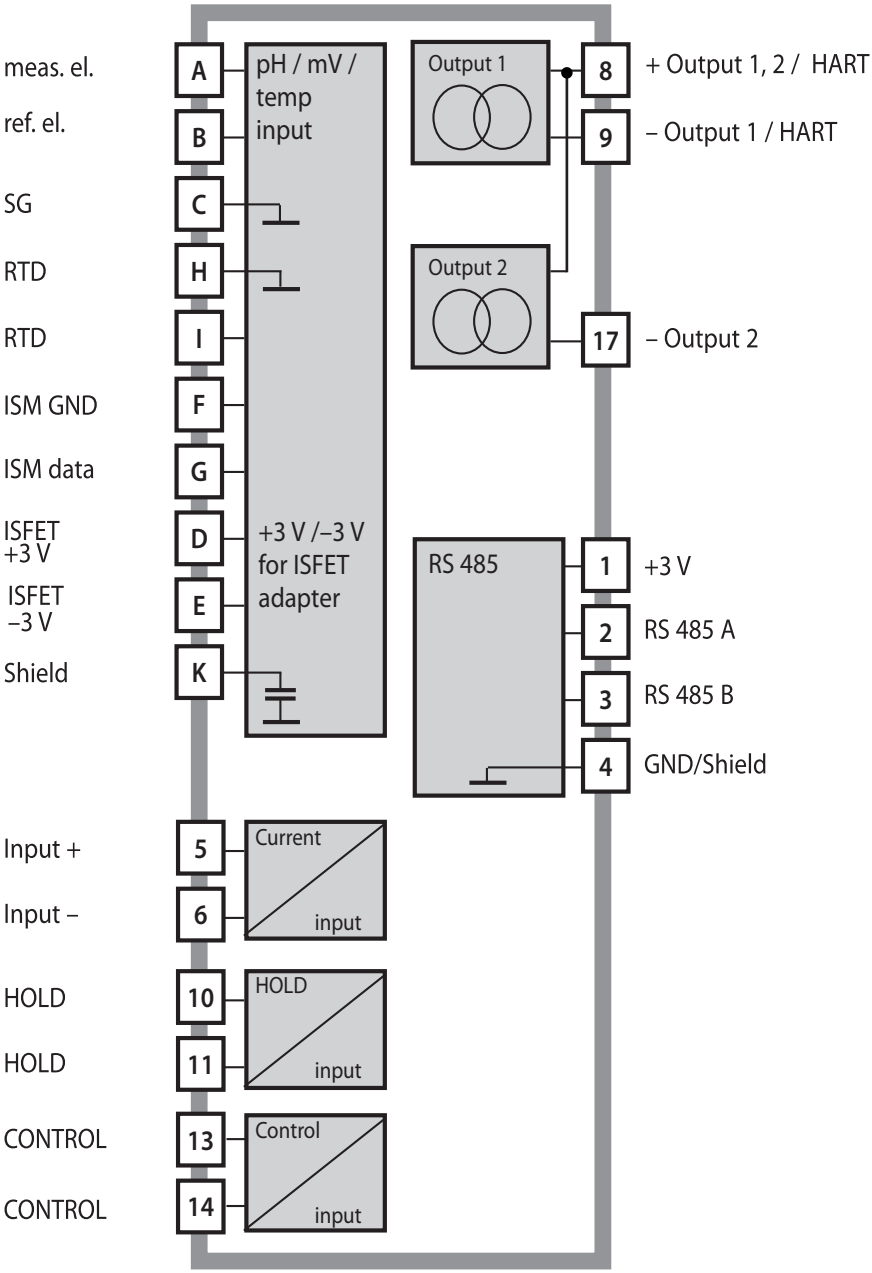
Stratos Pro A2...X rating plate at outside bottom of front with checkboxes for marking the respective application after installation

Terminals:

Screw terminal, suitable for single wires / flexible leads up to 2.5 mm^2 (AWG 14).
Recommended torque for the terminal screws: 0.5 ... 0.6 Nm.

Overview of Stratos Pro A2... PH



Package Contents

Check the shipment for transport damage and completeness!

The package should contain:

- Front unit, rear unit, bag containing small parts
- Specific test report
- Documentation (cf p. 3)
- CD-ROM

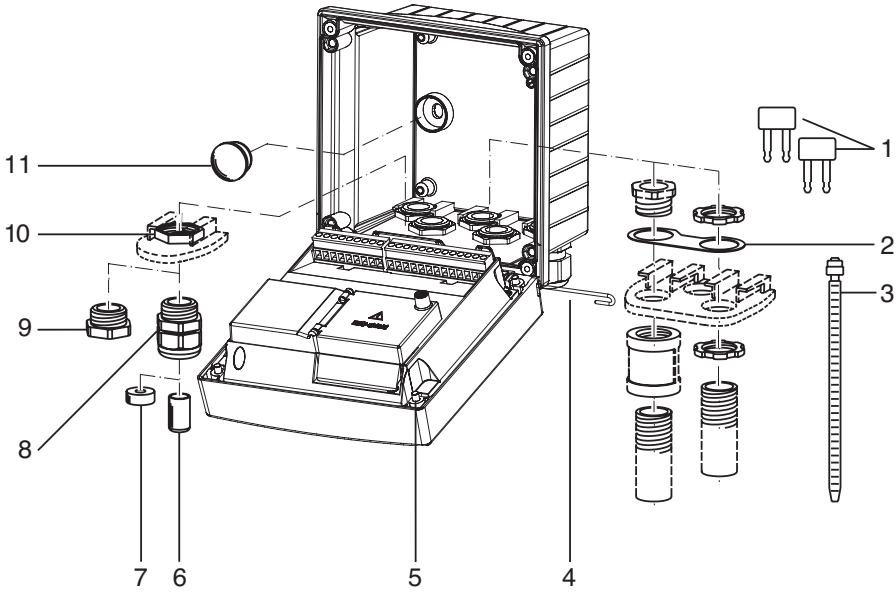
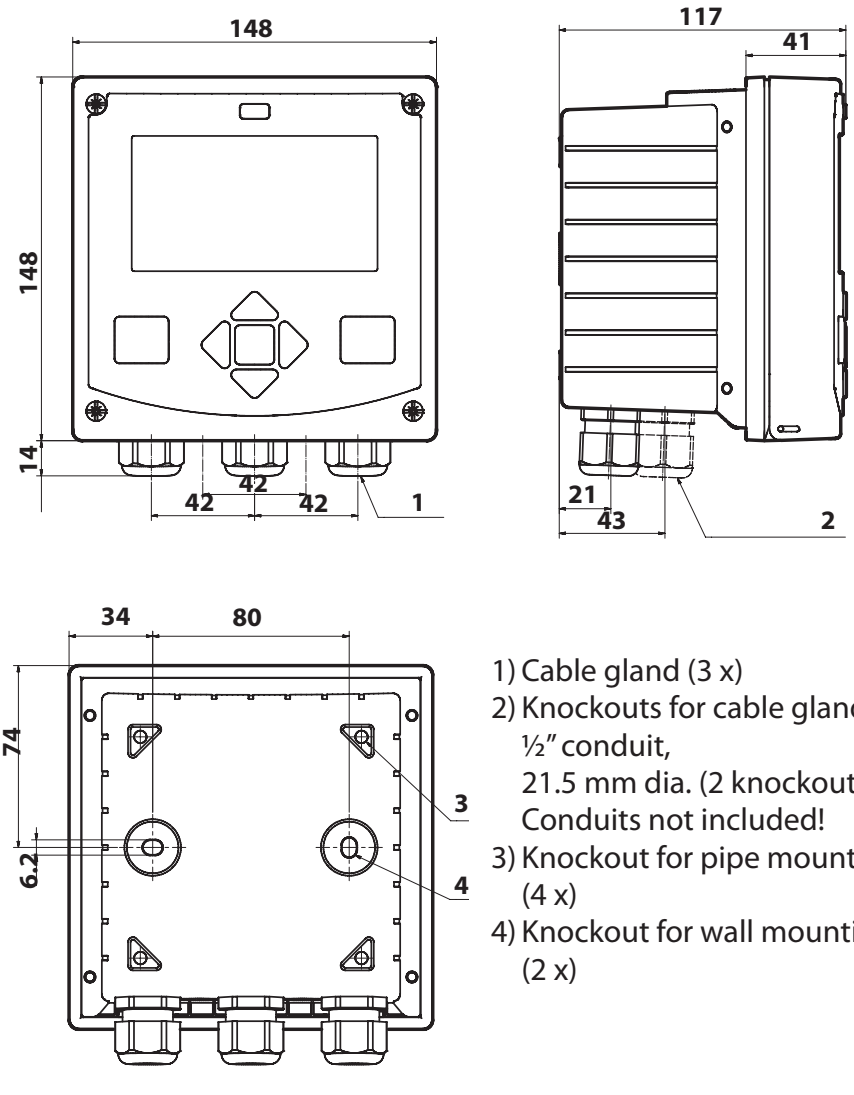


Fig.: Assembling the enclosure

1) Jumper (3 x)
2) Washer (1 x), for conduit mounting: Place washer between enclosure and nut
3) Cable tie (3 x)
4) Hinge pin (1 x), insertable from either side
5) Enclosure screw (4 x)
6) Sealing insert (1 x)
7) Rubber reducer (1 x)
8) Cable gland (3 x)
9) Filler plug (3 x)
10) Hexagon nut (5 x)
11) Sealing plug (2 x), for sealing in case of wall mounting

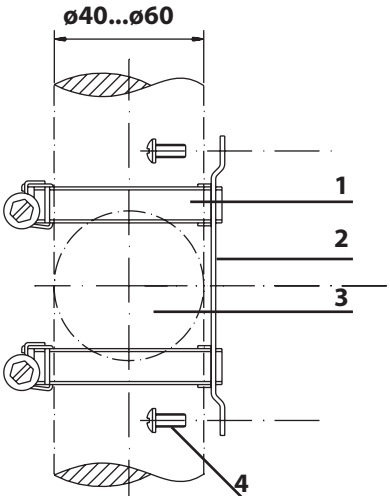
Mounting Plan, Dimensions



1) Cable gland (3 x)
2) Knockouts for cable gland or ½" conduit,
   21.5 mm dia. (2 knockouts)
   Conduits not included!
3) Knockout for pipe mounting (4 x)
4) Knockout for wall mounting (2 x)

Fig.: Mounting plan (All dimensions in mm!)

Pipe Mounting, Protective Hood



1) Hose clamp with worm gear drive to DIN 3017 (2 x)
2) Pipe-mount plate (1 x)
3) For vertical or horizontal posts or pipes
4) Self-tapping screw (4 x)

Fig.: Pipe-mount kit, accessory ZU 0274 (All dimensions in mm!)

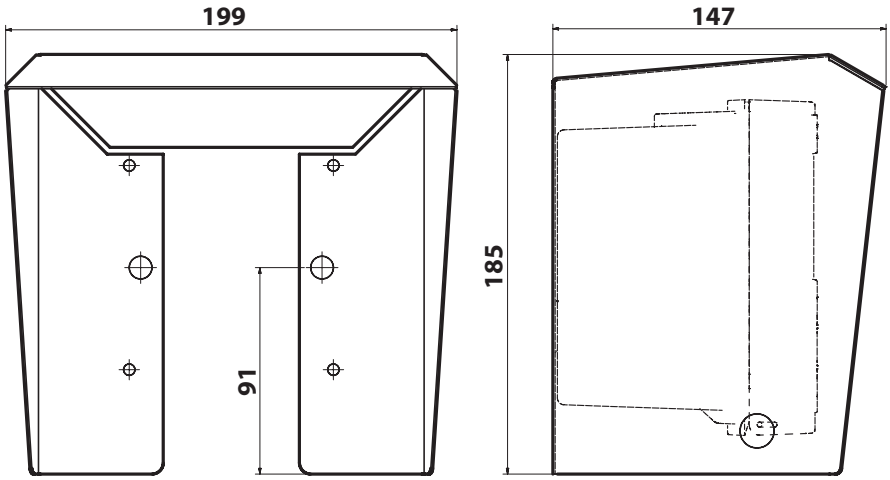
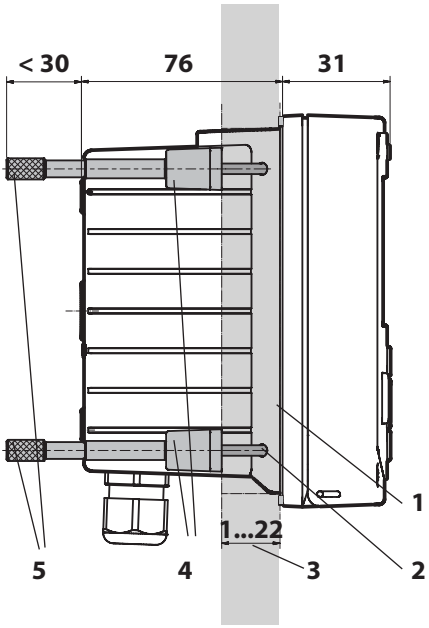


Fig.: Protective hood for wall and pipe mounting, accessory ZU 0737 (All dimensions in mm!)

Panel Mounting



1) Circumferential sealing (1 x)
2) Screws (4 x)
3) Position of control panel
4) Span piece (4 x)
5) Threaded sleeve (4 x)

Cutout
138 x 138 mm (DIN 43700)

Fig.: Panel-mount kit, accessory ZU 0738 (All dimensions in mm!)

Installation Instructions

- Installation of the device must be carried out by trained experts in accordance with this instruction manual and as per applicable local and national codes.
- Be sure to observe the technical specifications and input ratings during installation!
- Be sure not to notch the conductor when stripping the insulation!
- The supplied current must be galvanically isolated. If not, connect an isolator module.
- All parameters must be set by a system administrator prior to commissioning!

Terminals:

suitable for single wires / flexible leads up to 2.5 mm^2 (AWG 14)

Application in hazardous locations:

For use in hazardous locations, see separate "Certificates" document:

- IECEx
- ATEX
- FM
- CSA
- NEPSI
- GOST
- KOSHA

Rating Plates / Terminal Assignments

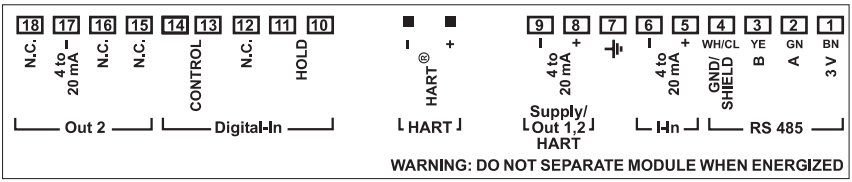


Fig.: Terminal assignments of Stratos Pro A2...

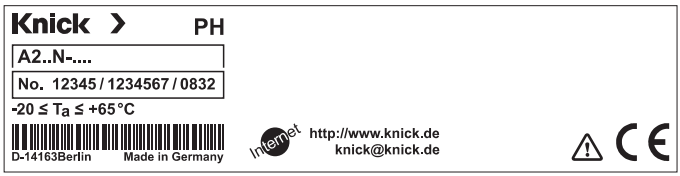


Fig.: Stratos Pro A2...N rating plate at outside bottom of front

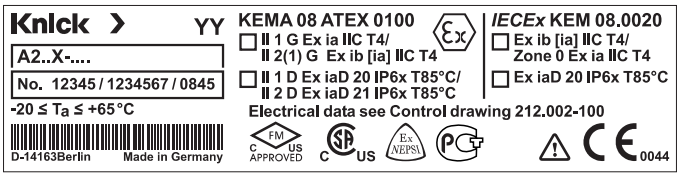

Knick
YY
A2..X-....
No. 12345 / 1234567 / 0845
-20 ≤ Ta ≤ +65 °C
D-14163Berlin
Made in Germany
KEMA 08 ATEX 0100
II 1 G Ex ia IIC T4/
II 2(1) G Ex ib [ia] IIC T4
II 1 D Ex iaD 20 IP6x T85°C/
II 2 D Ex iaD 21 IP6x T85°C
IECEx KEM 08.0020
Ex ib [ia] IIC T4/
Zone 0 Ex ia IIC T4
Ex iaD 20 IP6x T85°C
Electrical data see Control drawing 212.002-100
FM APPROVED
0044

Fig.: Stratos Pro A2...X rating plate at outside bottom of front

Note: The operator must indicate the type of protection!
When the device provides different types of protection, the operator must specify the applied type of protection during installation.
To do so, use the checkboxes on the rating plate.
See also "Safety Information" chapter.

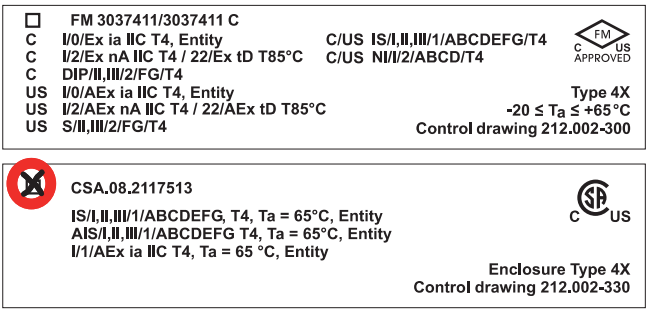
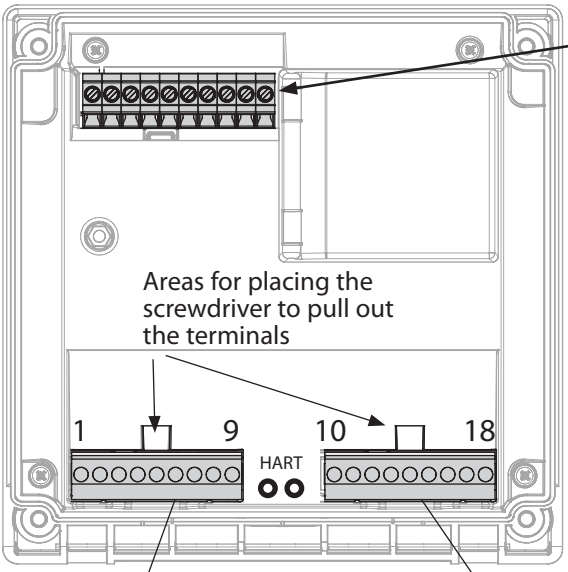

FM 3037411/3037411 C
C I/0/Ex ia IIC T4, Entity
C I/2/Ex nA IIC T4 / 22/Ex tD T85°C
C DIP/II,III/2/FG/T4
US I/0/AEx ia IIC T4, Entity
US I/2/AEx nA IIC T4 / 22/AEx tD T85°C
US S/II,III/2/FG/T4
C/US IS/I,II,III/1/ABCDEFG/T4
C/US NI/I/2/ABCD/T4
FM APPROVED
Type 4X
-20 ≤ Ta ≤ +65°C
Control drawing 212.002-300
CSA.08.2117513
IS/I,II,III/1/ABCDEFG, T4, Ta = 65°C, Entity
AIS/I,II,III/1/ABCDEFG T4, Ta = 65°C, Entity
I/1/AEx ia IIC T4, Ta = 65 °C, Entity
C US
Enclosure Type 4X
Control drawing 212.002-330

Fig.:
Example of an additional approval plate. The specifications refer to the respective device.

Wiring of Stratos Pro A2... PH



Terminal row 1	
1	+3 V
2	RS 485 A
3	RS 485 B
4	GND/shield
5	+ input
6	– input
7	PA
8	+out 1,2/HART
9	– out 1/HART

Terminal row 2	
10	hold
11	hold
12	n.c.
13	contr
14	contr
15	n.c.
16	n.c.
17	– out 2
18	n.c.

In addition:
2 HART pins (between terminal row 1 and 2)

Sensor connection MK-PH module	
A	meas. el.
B	ref. el.
C	SG
D	+3 V
E	–3 V
F	ISM GND
G	ISM data
H	RTD (GND)
I	RTD
K	Shield

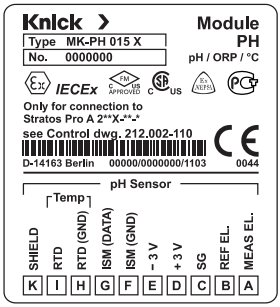
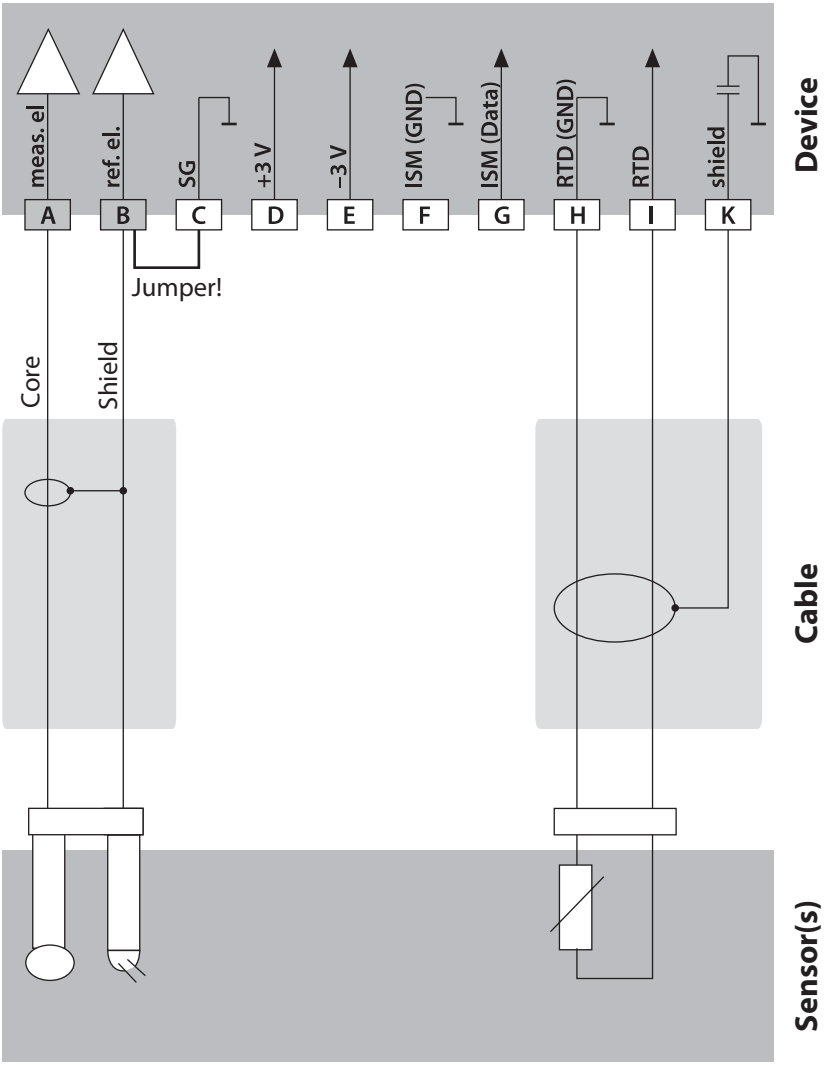


Fig.: MK-PH module terminal assignments

Fig.: Terminals, device opened, back of front unit

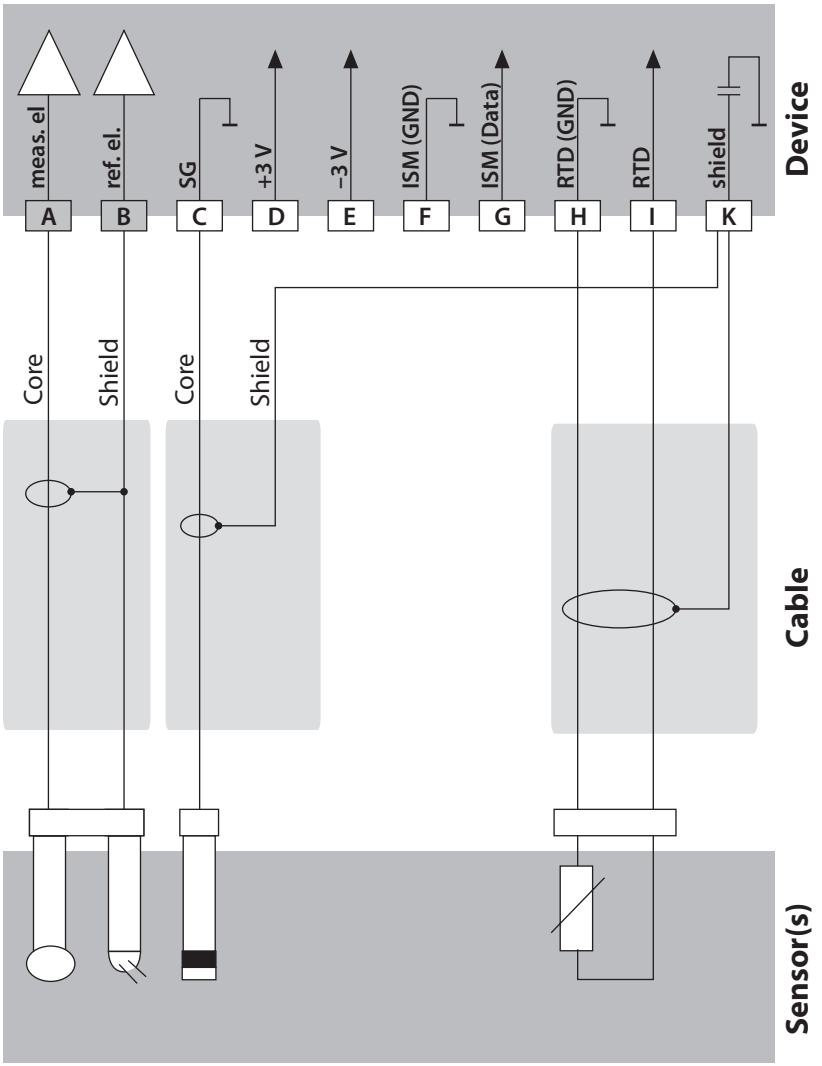
Example 1:

Measuring task: pH, temperature, glass impedance
Sensors (example): HA 405-DXK-58 (Mettler-Toledo)
Cable (example): AS9 ZU 0318 (Knick)



Example 2:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance
Sensors (example): pH: HA 405-DXK-58 (Mettler-Toledo),
Pt: ZU 0073 (Knick)
Cable (example): 2x AS9 ZU 0318 (Knick)

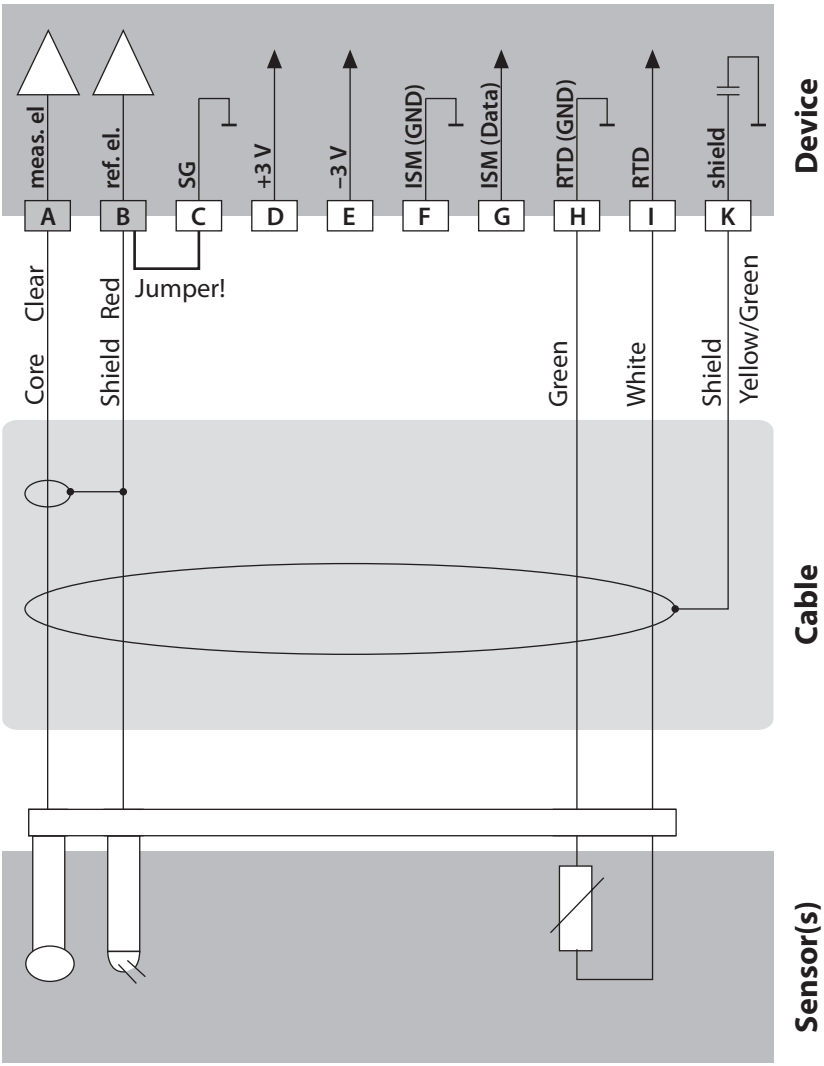


Example 3:

Measuring task: pH, temp, glass impedance

Sensors (example): SE 533 (Knick)

Cable (example): VP6 ZU 0313 (Knick)

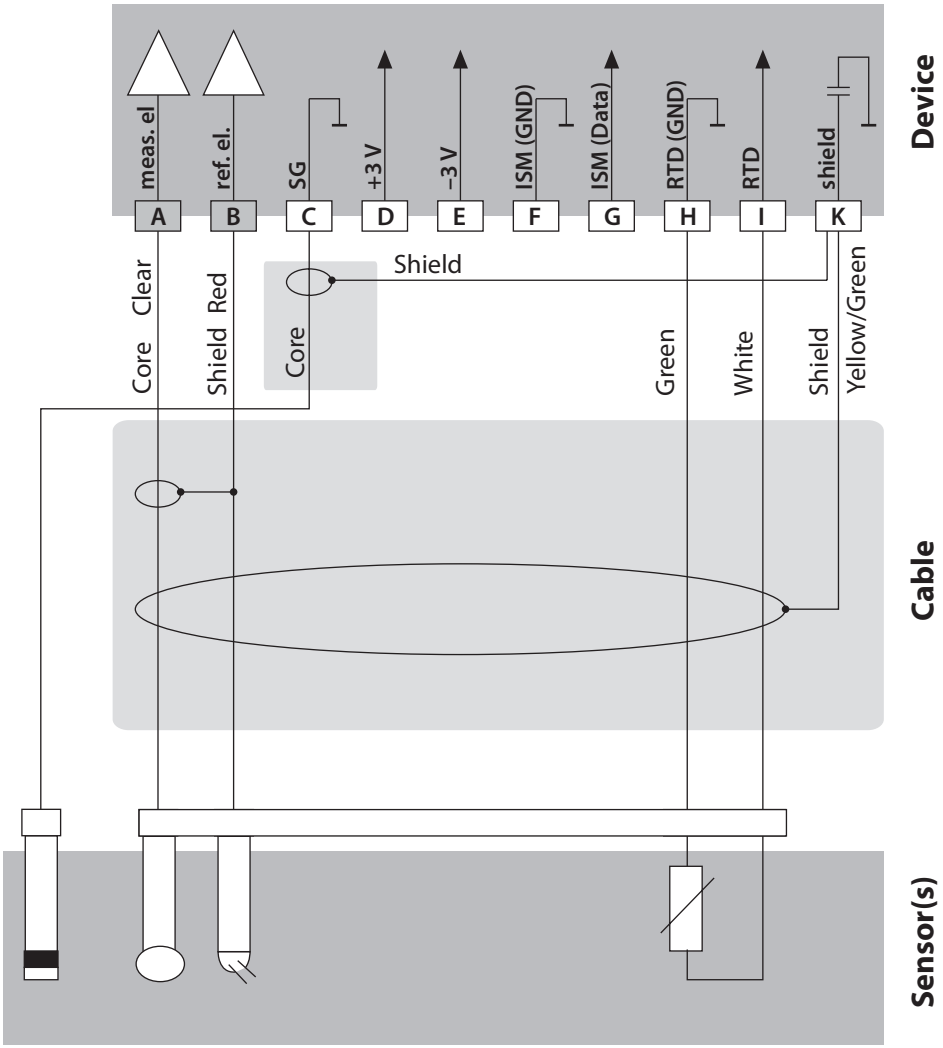


Example 4:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): pH: SE 533 (Knick)
Pt: ZU 0073 (Knick)

Cable (example): VP6 ZU 0313 (Knick) or AS9 ZU 0318 (Knick)

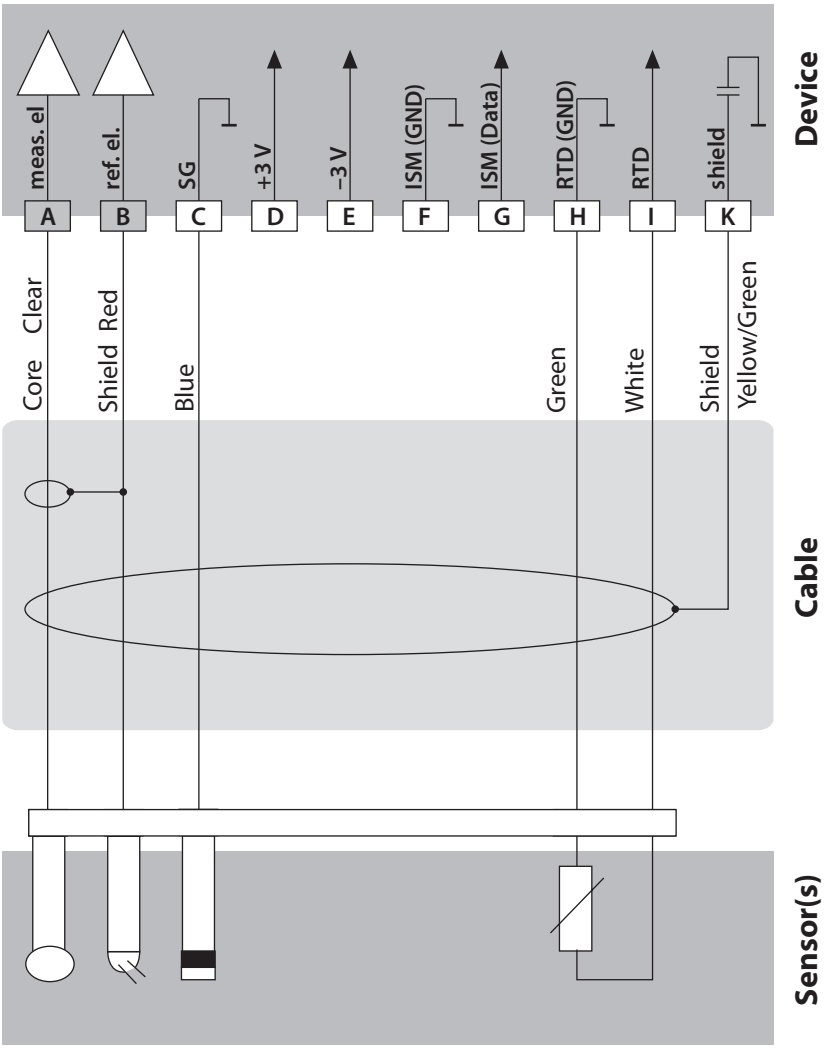


Example 5:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): InPro 4260 (Mettler-Toledo)

Cable (example): VP6 ZU 0313 (Knick)

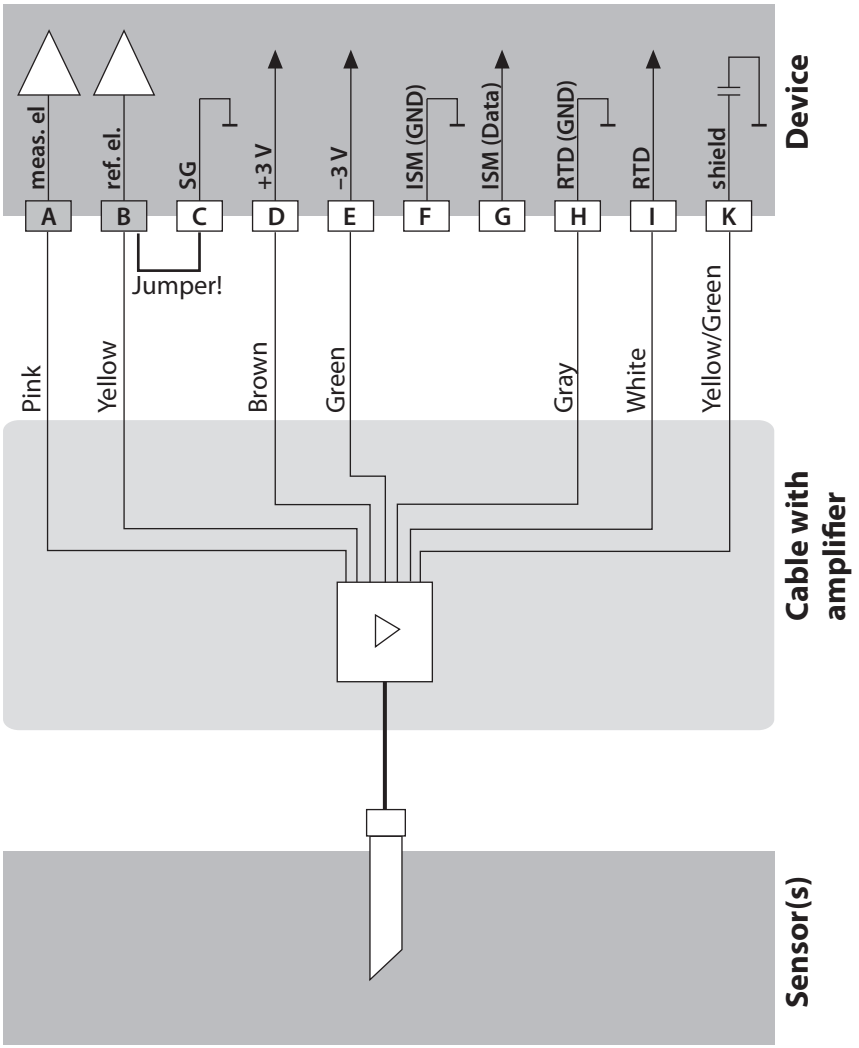


Example 6:

Measuring task: pH, temp (safe areas only)

Sensors (example): InPro 3300 ISFET (Mettler-Toledo)

Cable (example): ZU 0582 (Knick)



Example 7:

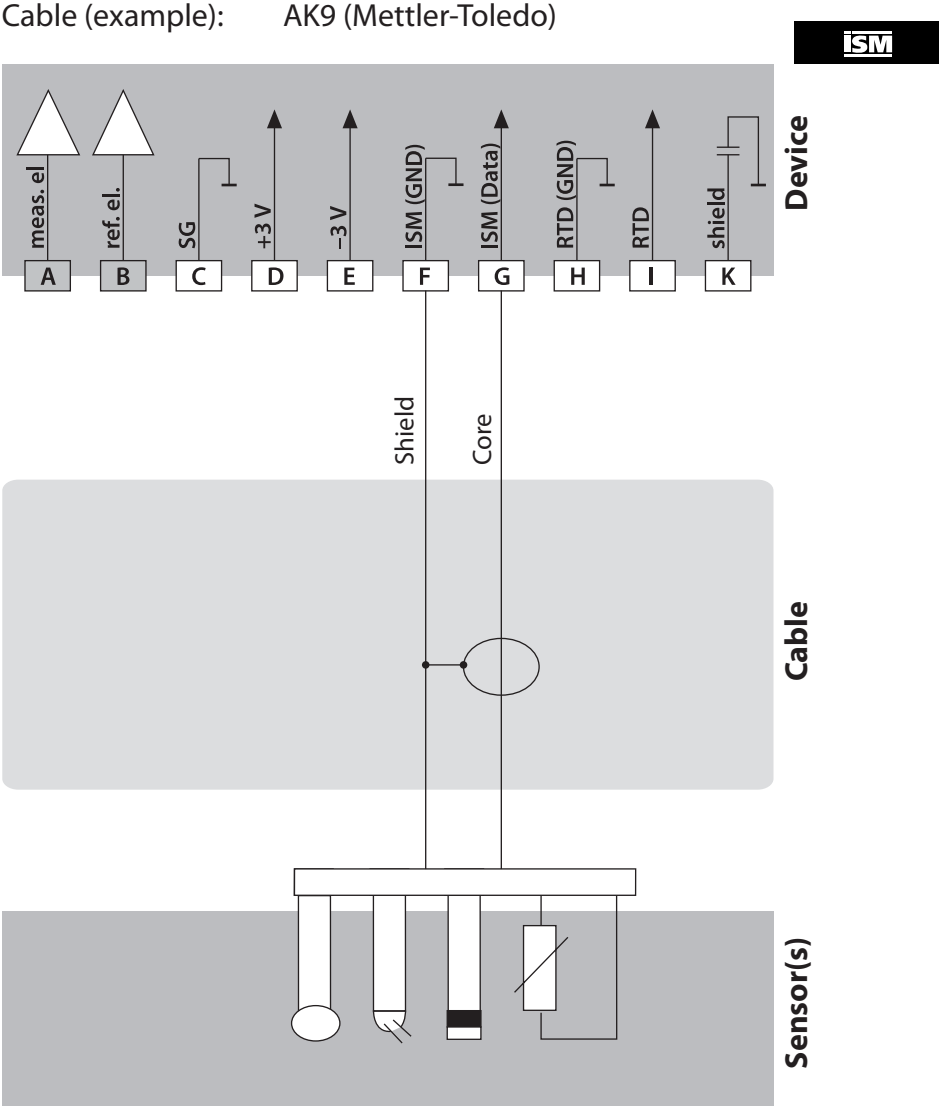
Caution!

Do not connect an additional analog sensor!

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): ISM digital InPro 4260i (Mettler-Toledo)

Cable (example): AK9 (Mettler-Toledo)

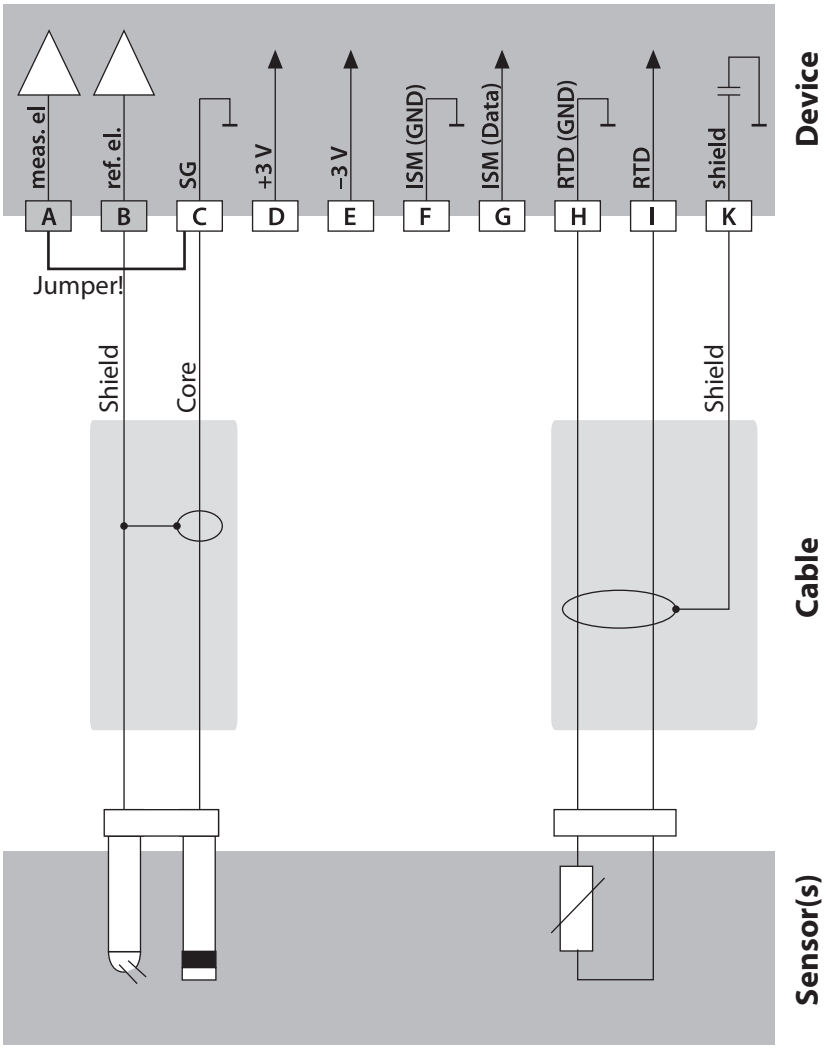


Example 8 – Note: Switch off Sensocheck!

Measuring task: ORP, temp, glass impedance, ref. impedance

Sensors (example): ORP: SE 535 (Knick)

Cable (example): AS9 ZU 0318 (Knick)

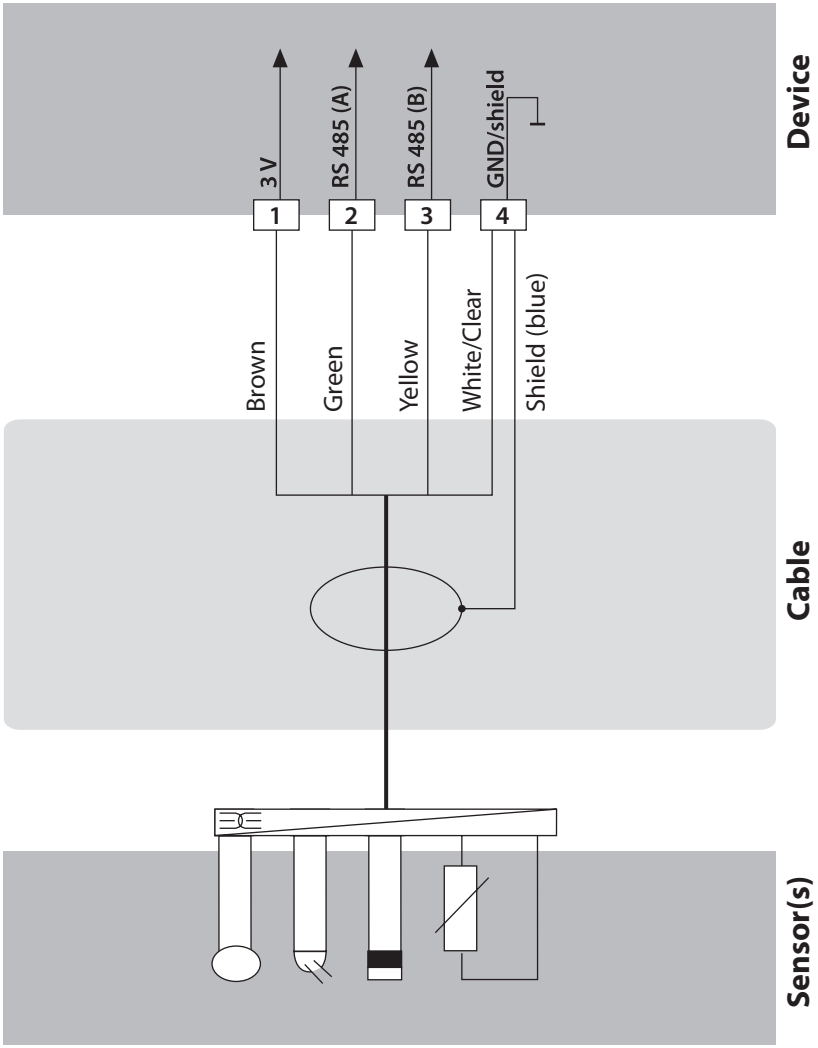


Example 9:

Measuring task: pH/ORP, temp, glass impedance, ref. impedance

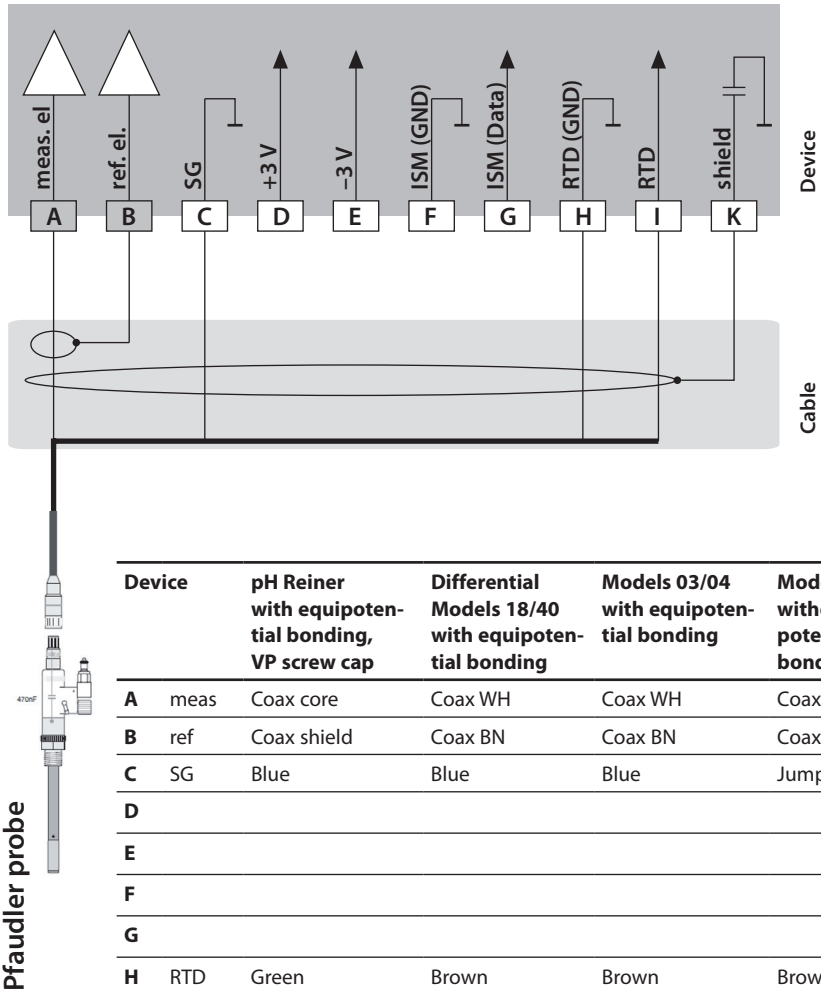
Sensors (example): SE 533/1-ADIN (Knick)

Cable (example): CA/003-NAADIN11 (Knick)



Example 10:

Connecting a Pfaudler probe:



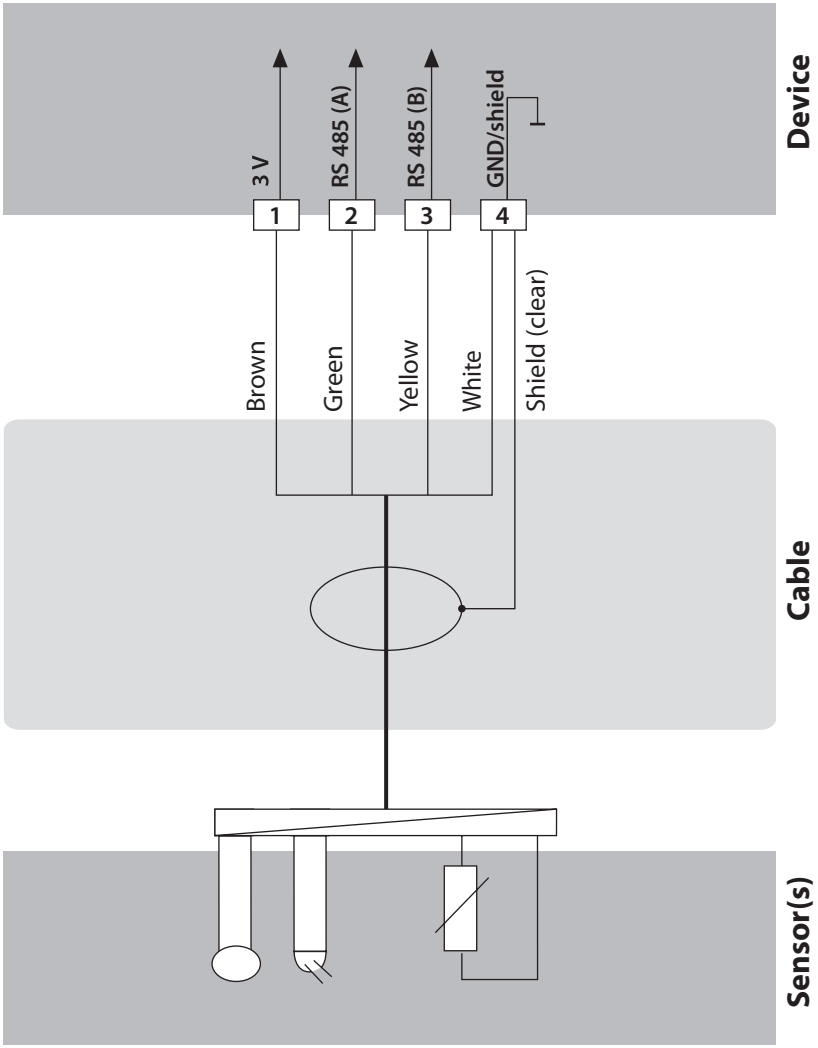
Device		pH Reiner with equipotential bonding, VP screw cap	Differential Models 18/40 with equipotential bonding	Models 03/04 with equipotential bonding	Models 03/04 without equipotential bonding
A	meas	Coax core	Coax WH	Coax WH	Coax WH
B	ref	Coax shield	Coax BN	Coax BN	Coax BN
C	SG	Blue	Blue	Blue	Jumper B/C
D					
E					
F					
G					
H	RTD (GND)	Green	Brown	Brown	Brown
I	RTD	White	Green, Black	Green, Black	Green, Black
K	Shield	Green/Yellow, Gray	Orange, Violet	Orange, Violet	Orange, Violet

Example 11: **Memosens**

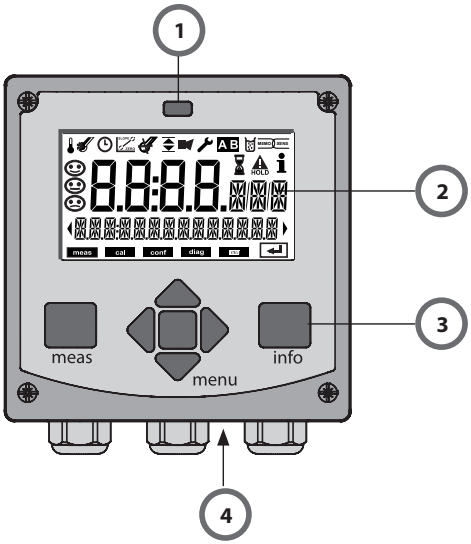
Measuring task: pH/ORP, temp, glass impedance, ref. impedance

Sensors (example): Orbisint CPS 11 D Memosens

Cable (example): CYK 10

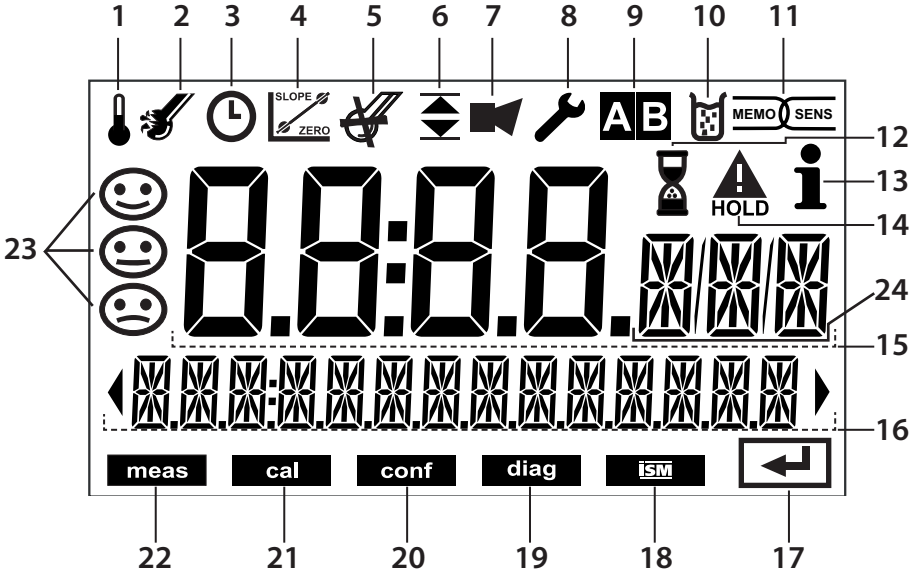


User Interface, Keypad



1 IrDA transmitter/receiver
2 Display
3 Keypad
4 Rating plate (enclosure bottom)

Key	Function
meas	• Return to last menu level • Directly to measuring mode (press > 2 s) • Measuring mode: other display
info	• Retrieve information • Show error messages
enter	• Configuration: Confirm entries, next configuration step • Calibration: Continue program flow
menu	• Measuring mode: Call menu
Arrow keys up / down	• Menu: Increase/decrease a numeral • Menu: Selection
Arrow keys left / right	• Previous/next menu group • Number entry: Move between digits



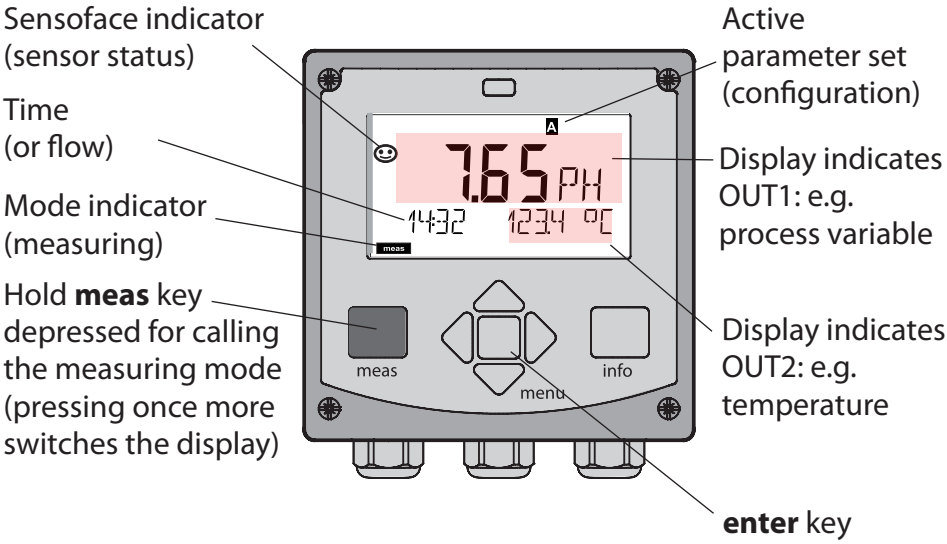
1 Temperature
2 Sensocheck
3 Interval/response time
4 Sensor data
5 Not used
6 Limit message:
Limit 1 ▼ or Limit 2 ▲
7 Alarm
8 Service
9 Parameter set
10 Calibration
11 Memosens sensor
12 Waiting time running
13 Info available
14 Hold mode active
15 Main display
16 Secondary display
17 Proceed using enter
18 ISM sensor
19 Diagnostics
20 Configuration mode
21 Calibration mode
22 Measuring mode
23 Sensoface
24 Unit symbols

Signal colors (display backlighting)

Red	Alarm (in case of fault: display values blink)
Red blinking	Input error: illegal value or wrong passcode
Orange	HOLD mode (Calibration, Configuration, Service)
Turquoise	Diagnostics
Green	Info
Purple	Sensoface message

Measuring Mode

After the operating voltage has been connected, the analyzer automatically goes to "Measuring" mode. To call the measuring mode from another operating mode (e.g. Diagnostics, Service): Hold **meas** key depressed (> 2 s).



Depending on the configuration, one of the following displays can be set as standard display for the measuring mode (see page 36):

- Measured value, time and temperature (default setting)
- Measured value and selection of parameter set A/B or flow
  Measured value and tag number ("TAG")
- Time and date

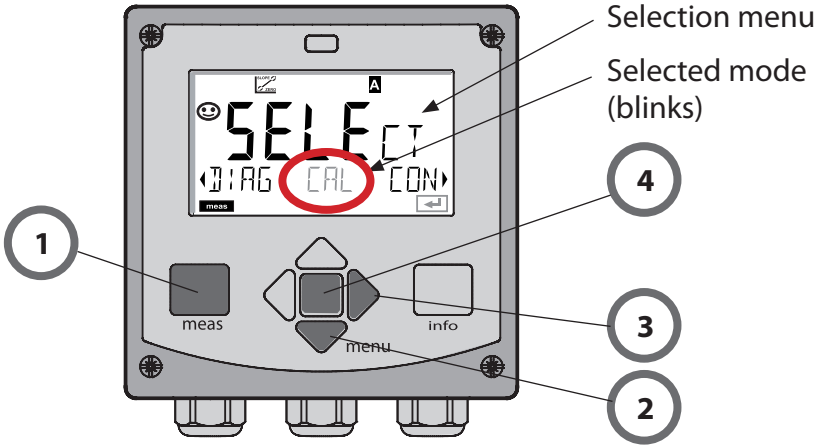
Note: By pressing the **meas** key in measuring mode you can view the displays for approx. 60 sec.

The device must be configured for the respective measurement task!

Selecting the Mode / Entering Values

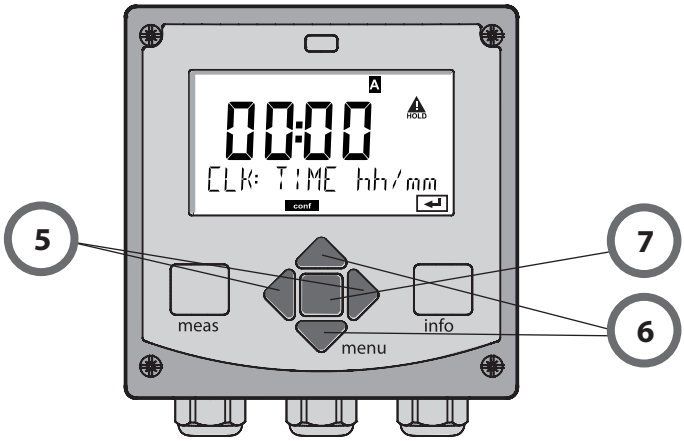
To select the operating mode:

1) Hold **meas** key depressed (> 2 s) (directly to measuring mode)
2) Press **menu** key: the selection menu appears
3) Select operating mode using left / right arrow key
4) Press **enter** to confirm the selected mode

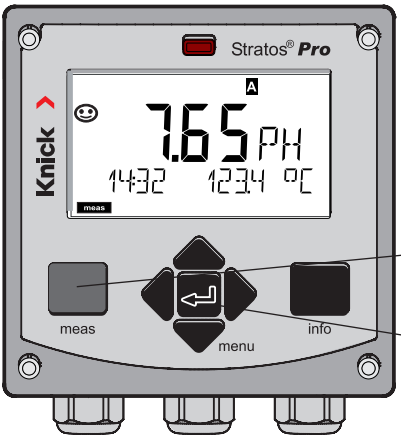


To enter a value:

5) Select numeral: left / right arrow key
6) Change numeral: up / down arrow key
7) Confirm entry by pressing **enter**



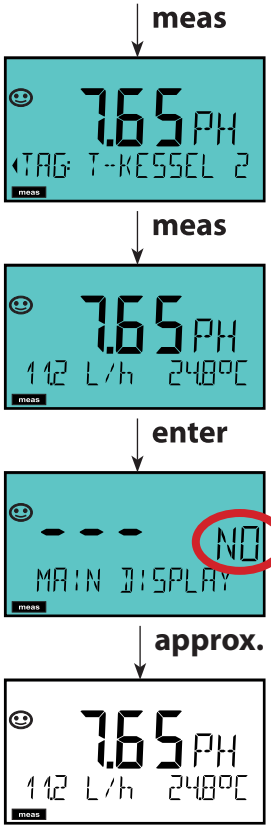
Display in Measuring Mode



The MAIN DISPLAY is the display which is shown in measuring mode. To call the measuring mode from any other mode, hold the **meas** key depressed for at least 2 sec.

meas key

enter key

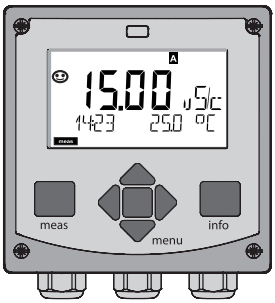


By pressing **meas** briefly you can step through further displays such as tag number (TAG) or flow (L/h). These displays are turquoise. After 60 sec they switch back to the main display.

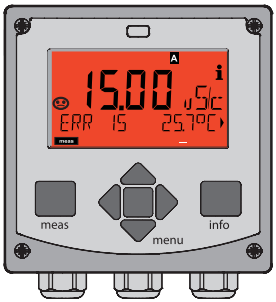
Press **enter** to select a display as MAIN DISPLAY – the secondary display shows "MAIN DISPLAY – NO". Use the **UP** / **DOWN** arrow keys to select "MAIN DISPLAY – YES" and confirm by pressing **enter**. The display color changes to white. This display is now shown in measuring mode.

Color-Coded User Interface

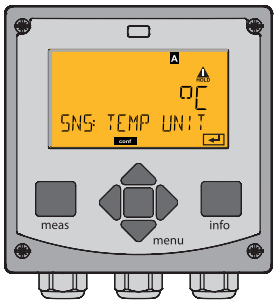
The color-coded user interface guarantees increased operating safety. Operating modes are clearly signaled.
The normal measuring mode is white. Information text appears on a green screen and the diagnostic menu appears on turquoise.
The orange HOLD mode (e.g. during calibration) is quickly visible as is the magenta screen which indicates asset management messages for predictive diagnostics – such as maintenance request, pre-alarm and sensor wear.
The alarm status has a particularly noticeable red display color and is also signaled by flashing display values. Invalid inputs or false pass-codes cause the entire display to blink red so that operating errors are noticeably reduced.



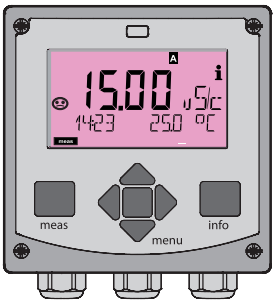
White:
Measuring mode



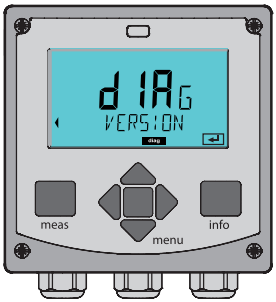
Red blinking:
Alarm, errors



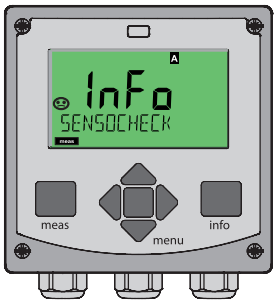
Orange:
HOLD mode



Magenta:
Maintenance request



Turquoise:
Diagnostics



Green:
Information texts

Operating Modes

Diagnostics
Display of calibration data, display of sensor data, performing a device self-test, viewing the logbook entries, display of hardware/software versions of the individual components. The logbook can store 100 events (00...99). They can be displayed directly on the device. The logbook can be extended to 200 entries using a TAN (Option).

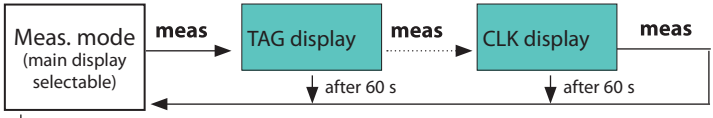
HOLD
Manual activation of HOLD mode, e.g. for replacing a digital sensor. The signal outputs adopt a defined state.

Calibration
Every sensor has typical characteristic values, which change in the course of the operating time. Calibration is required to supply a correct measured value. The device checks which value the sensor delivers when measuring in a known solution. When there is a deviation, the device can be "adjusted". In that case, the device displays the "actual" value and internally corrects the measurement error of the sensor. Calibration must be repeated at regular intervals. The time between the calibration cycles depends on the load on the sensor. During calibration the device is in HOLD mode.
During calibration the device remains in the HOLD mode until it is stopped by the operator.

Configuration
The analyzer must be configured for the respective measurement task. In the "Configuration" mode you select the connected sensor, the measuring range to be transmitted, and the conditions for warning and alarm messages. During configuration the device is in HOLD mode.
Configuration mode is automatically exited 20 minutes after the last keystroke. The device returns to measuring mode.

Service
Maintenance functions (monitor, current source), IrDA operation, passcode assignment, reset to factory settings, enabling of options (TAN).

Menu Structure of Modes and Functions



Pressing the **menu** key (down arrow) opens the selection menu.
Select the menu group using the left/right arrow keys.
Pressing **enter** opens a menu item. Press **meas** to return.

DIAG	CALDATA	Display of calibration data
	SENSOR	Display of sensor data
	SELFTEST	Self test: RAM, ROM, EEPROM, module
	LOGBOOK	100 events with date and time
	MONITOR	Display of measured values (mV_pH, mV_ORP, RTD, resistances of glass electrode, reference electrode)
	VERSION	Display of software version, model designation, serial number
HOLD		Manual activation of HOLD mode, e.g. for sensor replacement. The signal outputs behave as configured (e.g. last measured value, 21 mA)
CAL	CAL_PH	pH adjustment (as configured)
	CAL_ORP	ORP adjustment
	P_CAL	Product calibration
	ISFET-ZERO	Zero adjustment (for ISFET only)
	CAL_RTD	Adjustment of temperature probe
CONF	PARSET A	Configuring parameter set A
	PARSET B	Configuring parameter set B
SERVICE (Access via code, factory setting: 5555)	MONITOR	Display of measured values for validation (simulators)
	SENSOR	For ISM: Reset TTM, increment autoclaving counter
	OUT1	Current source, output 1
	OUT2	Current source, output 2
	IRDA	Activating the IrDA interface
	CODES	Specifying access codes for operating modes
	DEFAULT	Reset to factory setting
	OPTION	Enabling an option via TAN

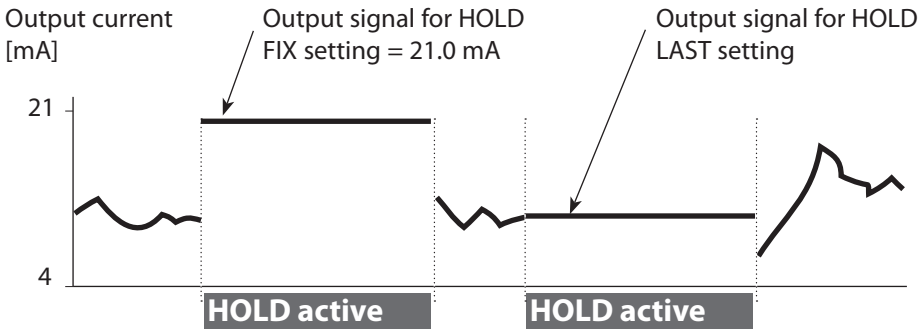
The HOLD mode is a safety state during configuration and calibration. Output current is frozen (LAST) or set to a fixed value (FIX).
The HOLD mode is indicated by orange display backlighting.

HOLD mode, display icon:

Output signal response

- **LAST:** The output current is frozen at its last value. Recommended for short configuration procedures. The process should not change decisively during configuration. Changes are not noticed with this setting!
- **FIX:** The output current is set to a value that is noticeably different from the process value to signal the control system that the device is being worked at.

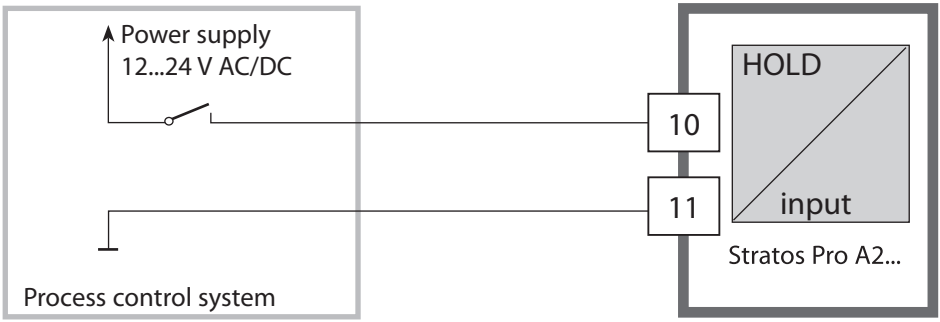
Output signal during HOLD:



Terminating the HOLD mode

The HOLD mode is ended by switching to measuring mode (hold **meas** key depressed). The display reads "Good Bye", after that, the HOLD mode is exited.
When the calibration mode is exited, a confirmation prompt ensures that the installation is ready for operation (e.g.: sensor reinstalled, located in process).

External activation of HOLD
The HOLD mode can be activated from outside by sending a signal to the HOLD input (e.g. from the process control system).



HOLD inactive	0...2 V AC/DC
HOLD active	10...30 V AC/DC

Manual activation of HOLD
The HOLD mode can be activated manually from the HOLD menu. This allows checking or replacing a sensor, for example, without provoking unintended reactions at the outputs.
Press **meas** key to return to selection menu.

Alarm

When an error has occurred, **Err xx** is displayed immediately.
Only after expiry of a user-defined delay time will the alarm be registered and entered in the logbook.
During an alarm the display blinks, the display backlighting turns **red**.

Error messages can also be signaled by a 22 mA output current (see Configuration).
2 sec after the failure event is corrected, the alarm status will be deleted.

Message	Released by	Cause
Alarm	Sensocheck	Polarization / Cable
(22 mA)	Error Messages	Flow (CONTROL input)
HOLD	HOLD	HOLD via menu or input
(Last/Fix)	CONF	Configuration
	CAL	Calibration
	SERVICE	Service

Generating a message via the CONTROL input (min. flow / max. flow)

The CONTROL input can be used for parameter set selection or for flow measurement (pulse principle), depending on its assignment in the "Configuration" menu.

When preset to flow measurement

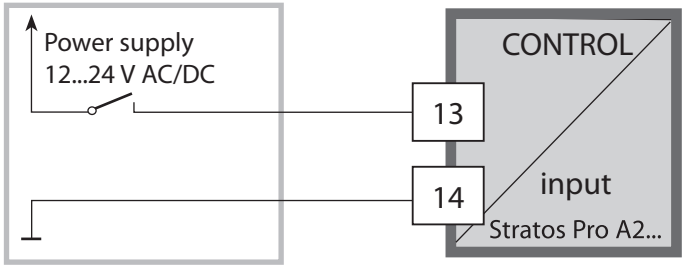
CONF/CNTR_IN/CONTROL = FLOW

an alarm can be generated when the measured flow exceeds a specified range:

CONF/ALA/FLOW CNTR = ON

CONF/ALA/FLOW min (specify value, default: 5 liters/h)

CONF/ALA/FLOW max (specify value, default: 25 liters/h)



Configuration

Menu Structure of Configuration

The device provides 2 parameter sets "A" and "B". By switching between the parameter sets you can adapt the device to different measurement situations, for example.
Parameter set "B" only permits setting of process-related parameters.
The configuration steps are assigned to different menu groups.
With the left/right arrow keys you can jump between the individual menu groups.
Each menu group contains menu items for setting the parameters.
Pressing **enter** opens a menu item. Use the arrow keys to edit a value.
Press **enter** to confirm/save the settings.
Return to measurement: Hold **meas** key depressed (> 2 s).

Select menu group	Menu group	Code	Display	Select menu item
	Sensor selection	SNS:		enter
		Menu item 1		enter
		⋮		enter
		Menu item ...		enter
	Current output 1	OT1:		
	Current output 2	OT2:		
	Compensation	COR:		
	Control input (parameter set or flow measurement)	IN:		
	Alarm mode	ALA:		
	Setting the clock	CLK:		
	Tag number	TAG:		

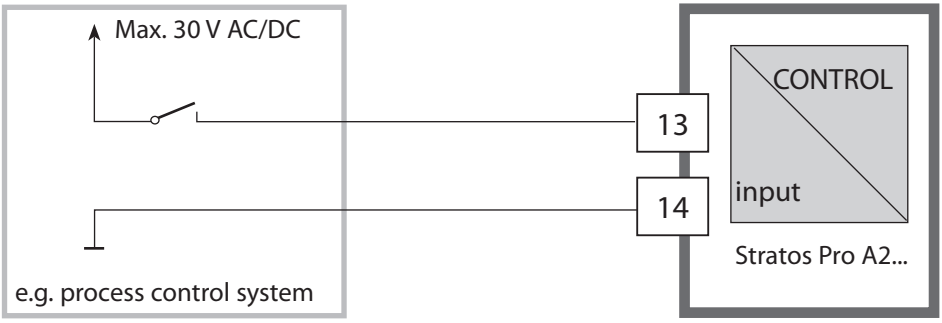
Parameter set A/B: configurable menu groups

The device provides 2 parameter sets "A" and "B". By switching between the parameter sets you can adapt the device to different measurement situations, for example. Parameter set "B" only permits setting of process-related parameters.

Menu group	Parameter set A	Parameter set B
SENSOR	Sensor selection	---
OUT1	Current output 1	Current output 1
OUT2	Current output 2	Current output 2
CORRECTION	Compensation	Compensation
CNTR_IN	Control input	---
ALARM	Alarm mode	Alarm mode
PARSET	Parameter set selection	---
CLOCK	Setting the clock	---
TAG	Tag number	---

External switchover of parameter sets A/B

You can switch between parameter sets A and B by applying a signal to the CONTROL input (parameter setting: CNTR-IN – PARSET).



Parameter set A active	0...2 V AC/DC
Parameter set B active	10...30 V AC/DC

Manual switchover of parameter sets A/B

Display	Action	Remark
	To switch between parameter sets: Press **meas**.	Manual selection of parameter sets must have been preset in CONFIG mode. Default setting is a fixed parameter set A. Wrong settings change the measurement properties!
	PARSET blinks in the lower line. Select parameter set using ◂ and ▸ keys	
	Select PARSET A / PARSET B	
	Press **enter** to confirm. Cancel by pressing **meas**.	

Configuration			Select	Default
Sensor (SENSOR)				
SNS:			STANDARD, ISFET INDUCON, ISM MEMOSENS	STANDARD
	RTD TYPE (omitted for ISM)		100 PT, 1000 PT, 30 NTC, 8.55 NTC, Balco 3kOhm	100 PT
	TEMP UNIT		°C / °F	°C
	TEMP MEAS *)		AUTO, MAN, EXT (EXT. only with I-input enabled via TAN)	AUTO
		MAN	–20...200 °C (–4...392 °F)	025.0 °C (077.0 °F)
	TEMP CAL		AUTO, MAN, EXT (EXT. only with I-input enabled via TAN)	AUTO
		MAN	–20...200 °C (–4...392 °F)	025.0 °C (077.0 °F)
	NOM ZERO **)		0.00 ... 14.00 PH	07.00 PH
	NOM SLOPE **)		30.0 ... 60.0 mV	059.2 mV
	PH_ISO **)		0.00 ... 14.00 PH	07.00 PH
	CAL MODE		AUTO, MAN, DAT	AUTO
		AUTO BUFFER SET	-01-...-10-, -U1- **Note:** Pressing **info** displays nominal buffer values + manufacturer	-02-
		U1 (For specifiable buffer set, see Appendix: "Buffer Tables")	EDIT BUFFER 1 (NO, YES)	NO
			Enter values for buffer 1	
			EDIT BUFFER 2 (NO, YES)	NO
			Enter values for buffer 2	
	CAL TIMER (omitted for ISM)		OFF, FIX, ADAPT	OFF
	ON	CAL-CYCLE	0...9999 h	0168 h

*) The setting: TEMP MEAS: AUTO/MAN/EXT applies to all outputs: OUT1/OUT2/display; Sensors with deviating zero/slope require the "Pfaudler" option (TAN). Settings with "Sensor: STANDARD" selected (not required for Memosens Pfaudler sensor).

**) only with STANDARD and Pfaudler option (TAN), not with Memosens Pfaudler.

Configuration				Select	Default
Sensor (SENSOR)					
SNS:	ISM (for ISM sensors only)	ACT (Adaptive Calibration Timer)		OFF AUTO MAN	OFF
		MAN	ACT CYCLE	0...9999 DAY	0007 DAY
		TTM (Time to Maintenance)		OFF AUTO MAN	OFF
		MAN	TTM CYCLE	0...9999 DAY	0030 DAY
	Inducon, ISM	CIP COUNT		ON/OFF	OFF
		ON	CIP CYCLES	0...9999 CYC	0025 CYC
		SIP COUNT		ON/OFF	OFF
		ON	SIP CYCLES	0...9999 CYC	0025 CYC
		AUTOCLAVE		ON/OFF	OFF
		ON	AC CYCLES	0...9999 CYC	0000 CYC
Output 1 (OUT1)					
OT1:	CHANNEL			PH/ORP/TMP	PH
	PH	BEGIN 4mA (0 mA)		–2.00...16 PH	00.00 PH
		END 20 mA		–2.00...16 PH	14.00 PH
	ORP	BEGIN 4mA (0 mA)		–1999...1999 mV	
		END 20 mA		–1999...1999 mV	
	TMP °C	BEGIN 4mA (0 mA)		–20...300 °C	Select °C / °F at "Sensor"
		END 20 mA		–20...300 °C	
	TMP °F	BEGIN 4mA (0 mA)		–4...572 °F	
		END 20 mA		–4...572 °F	
	FILTERTIME			0...120 SEC	0000 SEC
	FAIL 22 mA			ON/OFF	OFF
	FACE 22 mA			ON/OFF	OFF
	HOLD MODE			LAST/FIX	LAST
	FIX	HOLD-FIX		4 ... 22 mA	021.0 mA

Configuration				Select	Default
Output 2 (OUT2)					
OT2:	CHANNEL			PH/ORP/TMP	TMP
	PH	BEGIN 4mA (0 mA)		–2.00...16 PH	00.00 PH
		END 20 mA		–2.00...16 PH	14.00 PH
	ORP	BEGIN 4mA (0 mA)		–1999...1999 mV	
		END 20 mA		–1999...1999 mV	
	TMP °C	BEGIN 4mA (0 mA)		–20...300 °C	Select °C / °F at "Sensor"
		END 20 mA		–20...300 °C	
	TMP °F	BEGIN 4mA (0 mA)		–4...572 °F	
		END 20 mA		–4...572 °F	
	FILTERTIME			0...120 SEC	0000 SEC
	FAIL 22 mA			ON/OFF	OFF
	FACE 22 mA			ON/OFF	OFF
	HOLD MODE			LAST/FIX	LAST
	FIX	HOLD-FIX		4 ... 22 mA	021.0 mA
Temperature compensation (CORRECTION)					
COR:	TC SELECT			OFF / LIN / PURE WTR / USER TAB	OFF
	LIN	TC LIQUID		-19.99 ... 19.99 %/K	00.00 %/K
	USERTAB	EDIT TABLE		NO/YES	NO
	TC xxx °C			0 ... 100 °C in 5°C steps	
	ON	I-INPUT		0...20 mA/4...20 mA	4...20 mA
		°C	BEGIN 4 mA	–20...200 °C	000.0 °C
			END 20 mA	–20...200 °C	100.0 °C
		°F	BEGIN 4 mA	–4...392 °F	032.0 °F
			END 20 mA	–4...392 °F	212.0 °F

Configuration			Select	Default
Control input (CNTR_IN)				
IN:	CONTROL		Parameter-set switchover (PARSET) or flow measurement (FLOW)	PARSET
	FLOW	FLOW ADJUST	12000 pulses/liter	0 ... 20000 pulses/liter
Alarm (ALARM)				
ALA:	DELAYTIME		0...600 SEC	0010 SEC
	SENSOCHECK		ON/OFF	OFF
	FLOW CNTR **)		ON/OFF	OFF
	ON	FLOW MIN **)	005.0 L/h	0 ... 99.9 L/h
		FLOW MAX**)	025.0 L/h	0 ... 99.9 L/h
Real-time clock (CLOCK)				
CLK:	FORMAT		24 h / 12 h	
	24 h	TIME hh/mm	00..23:00...59	
	12 h	TIME hh/mm	00...11 AM/ PM:00...59	
	DAY/MONTH		01...31/01...12	
	YEAR		2000...2099	
Tag number (TAG)				
TAG:	(Input in text line)			___

*) is only displayed if enabled and SENSOR: TEMP EXT has been selected.
**) Hysteresis fixed at 5% of threshold value

Support of Pfaudler Sensors

or pH sensors with a zero point other than pH 7 and/or deviating slope,
e.g. pH sensors with a zero point at pH 4.6

This requires an additional function (TAN). The option is enabled in the SERVICE / OPT: PFAUDLER menu (see page 121).

For Pfaudler standard pH sensors, you can specify a nominal zero point and a nominal slope.
In addition, you can enter a pHiso value.
The additional entries appear in the CONFIGURATION / SENSOR menu:

SNS: NOM ZERO (default: 07.00 pH)
SNS: NOM SLOPE (default: 59.2 mV)
SNS: PH_ISO (default: 07.00 pH)

Prior to measurement, you must enter the values for nominal zero and slope and the isothermal intersection point pHiso as provided by the manufacturer and perform a calibration using suitable buffer solutions.
When you use a Memosens Pfaudler sensor, the data will be read from the sensor or will be set to standard values. Here, you do not have to make entries. The respective menu items will be suppressed.
The nominal ZERO/SLOPE values are required for the proper functioning of the sensor monitoring and calibration functions (Sensoface, Calimatic), they do not replace an adjustment (calibration)!

Typical values				
Probe	Pfaudler enamel probes (Pfaudler specifications)	Probes with absolute pH measurement and Ag/AgCl reference system	Probes with absolute pH measurement and Ag/A (silver acetate) reference system	Differential pH probe
Nom. slope	55 mV/pH	55 mV/pH	55 mV/pH	55 mV/pH
Nom. zero	pH 8.65	pH 8.65	pH 1.35	pH 7 ... 12
pHiso	pH 1.35	pH 1.35	pH 1.35	pH 3.00

Please note:
Please refer to the operating instructions of the respective sensor for more information on functioning, installation, calibration and configuration.

Parameter Sets (Original for Copy)

Parameter	Parameter set A	Parameter set B
SNS: Sensor type		--- *)
SNS: RTD type		---
SNS: Temperature unit		---
SNS: Temp measurement		---
SNS: Manual meas. temp		---
SNS: Calibration temp		---
SNS: Manual cal temp		---
SNS: Calibration mode		---
SNS: Select buffer set (-U1-, see Appendix)		---
SNS: Calibration timer		---
SNS: Calibration cycle		---
SNS: ISM adaptive cal timer (ACT)		---
SNS: ISM adaptive maintenance timer (TTM)		---
SNS: CIP counter		---
SNS: CIP cycles		---
SNS: SIP counter		---
SNS: SIP cycles		---
SNS: Autoclaving counter		---
OT1: Process variable		
OT1: Current start		
OT1: Current end		
OT1: Filter time		
OT1: 22 mA error current		
OT1: Sensoface 22mA error current		
OT1: HOLD mode		
OT1: HOLD-FIX current		
OT2: Process variable		
OT2: Current start		

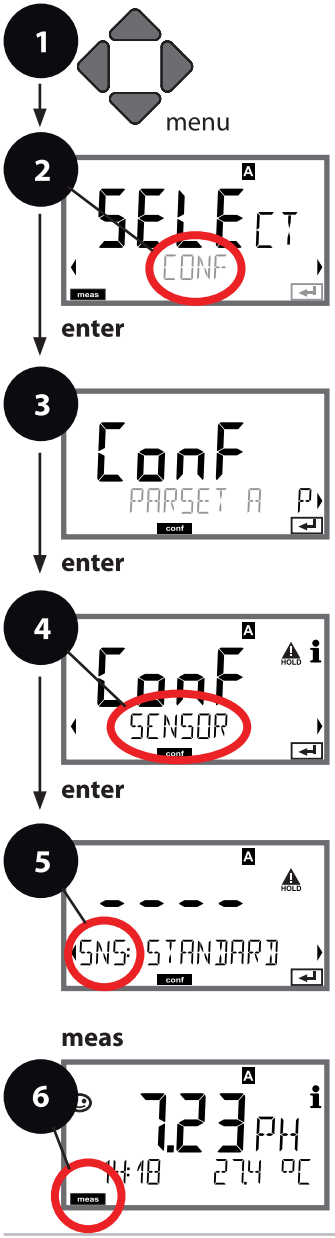
*) These parameters cannot be adjusted in parameter set B, the values are the same as in parameter set A.

Parameter	Parameter set A	Parameter set B
OT2: Current end		
OT2: Filter time		
OT2: 22 mA error current		
OT2: Sensoface 22mA error current		
OT2: HOLD mode		
OT2: HOLD-FIX current		
COR: Temp coefficient		
COR: Ext. temp input		
COR: Current range		
COR: Current start		
COR: Current end		
IN: Parameter set A/B or flow		
IN: (Flow meter) Adjusting pulses/liter		
ALA: Delay		
ALA: Sensocheck on/off		
ALA: Flow control FLOW CNTR on/off		
ALA: Minimum flow (hysteresis fixed at 5 %)		
ALA: Maximum flow (hysteresis fixed at 5 %)		
PAR: Parameter set selection		--- *)
CLK: Time format		---
CLK: Time hh/mm		---
CLK: Day/month		---
CLK: Year		---
TAG: Tag number		---

*) These parameters cannot be adjusted in parameter set B, the values are the same as in parameter set A.

Sensor

Select: sensor type, temperature probe, temperature unit, temp detection during measurement

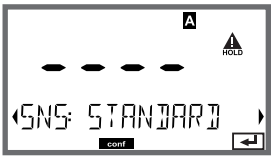
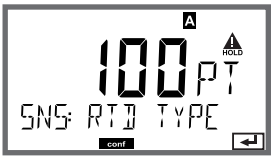
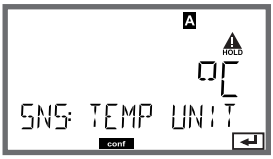
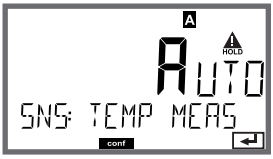
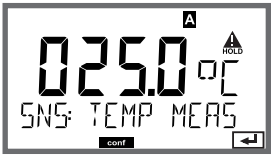


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

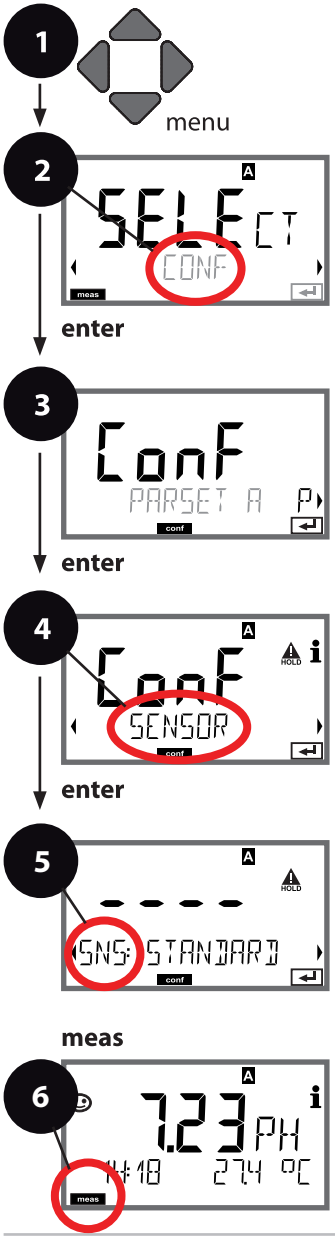
Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
Cleaning cycles
Cleaning cycle counter
Sterilization cycles
Sterilization cycle counter

enter

Menu item	Action	Choices
Select sensor type 	Select sensor type using ▲ ▼ keys. Press **enter** to confirm.	**STANDARD** ISFET Digital sensors: INDUCON ISM MEMOSENS
Select type of temp probe 	(not for digital sensors) Select type of temperature probe using ▲ ▼ keys. Press **enter** to confirm.	**100 PT** 1000 PT 30 NTC 8.55 NTC Balco 3 kOhm
Temperature unit 	Select °C or °F using ▲ ▼ keys. Press **enter** to confirm.	**°C** / °F
Temp detection during measurement 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: Direct input of temperature, no measurement (see next step) EXT: Temperature specified via current input (only if TAN E enabled) Press **enter** to confirm.	**AUTO** MAN EXT
(Manual temperature) 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–20...200 °C (–4...+392 °F)

Sensor

Select: temp detection during calibration, calibration mode

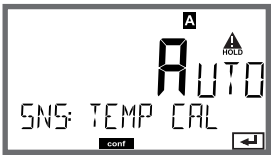
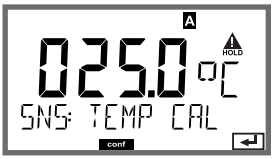
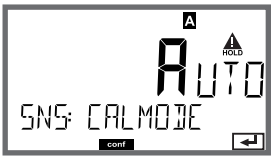
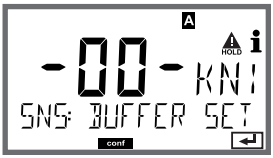


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

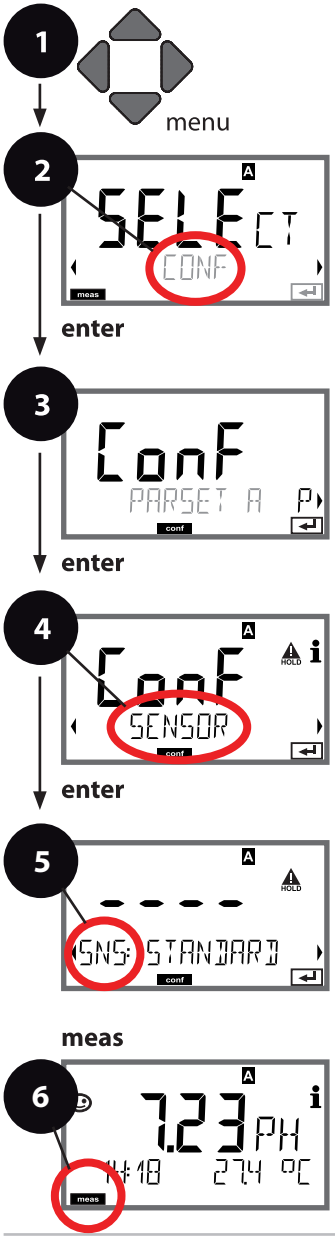
5

Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
Cleaning cycles
Cleaning cycle counter
Sterilization cycles
Sterilization cycle counter

enter

Menu item	Action	Choices
Temp detection during calibration 	Select mode using ▲ ▼ keys: AUTO: Measured by sensor MAN: Direct input of temperature, no measurement (see next step) EXT: Temperature specified via current input (only if TAN E enabled) Press **enter** to confirm.	**AUTO** MAN EXT
(Manual temperature) 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–20...200 °C (–4...+392 °F)
Calibration mode 	Select CALMODE using ▲ ▼ keys: AUTO: Calibration with Calimatic buffer set recognition MAN: Manual entry of buffer solutions DAT: Input of adjustment data of premeasured sensors Press **enter** to confirm.	**AUTO** MAN DAT
(AUTO: Buffer set) 	Select buffer set using ▲ ▼ keys (see buffer tables for nominal values). Press **enter** to confirm.	-00-...-10-, (-U1-, see Appendix) Pressing the **info** key displays the manufacturer and nominal values in the lower line.

Sensor
Adjust: Cal timer, cal cycle



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
Cleaning cycles
Cleaning cycle counter
Sterilization cycles
Sterilization cycle counter

enter

Menu item	Action	Choices
Calibration timer 	Adjust CALTIMER using ▲ ▼ keys: OFF: No timer ADAPT: Maximum cal cycle (adjust in the next step) FIX: Fixed cal cycle (adjust in the next step) Press **enter** to confirm.	**OFF**/ADAPT/FIX With ADAPT, the calibration cycle is automatically reduced depending on the sensor load (high temperatures and pH values) and for digital sensors also depending on the sensor wear
Calibration cycle 	Only with FIX/ADAPT: Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	0...9999 h

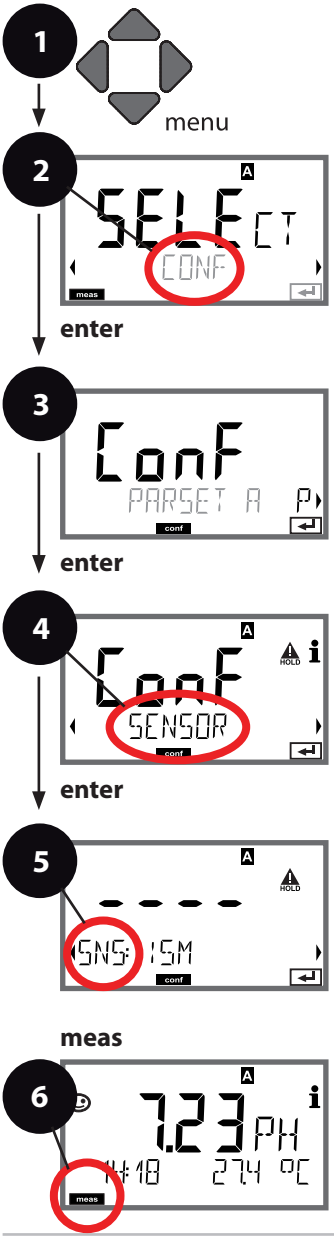
Note for the calibration timer:
When Sensocheck has been activated in the Configuration – Alarm menu, the expiration of the calibration interval is indicated by Sensoface:

Display	Status
+	Over 80 % of the calibration interval has already past.
+	The calibration interval has been exceeded.

The calibration timer settings apply to both parameter sets A and B.

The time remaining until the next due calibration can be seen in the diagnostics menu (see Diagnostics chapter).

ISM Sensor
Adaptive cal timer (ACT)



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Select sensor type
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
CIP/SIP cycles
Autoclaving counter

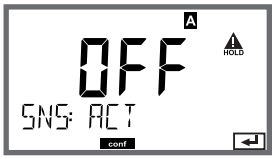
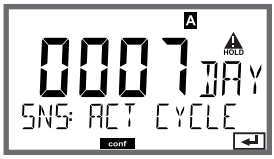
enter

Adaptive Calibration Timer (ACT)

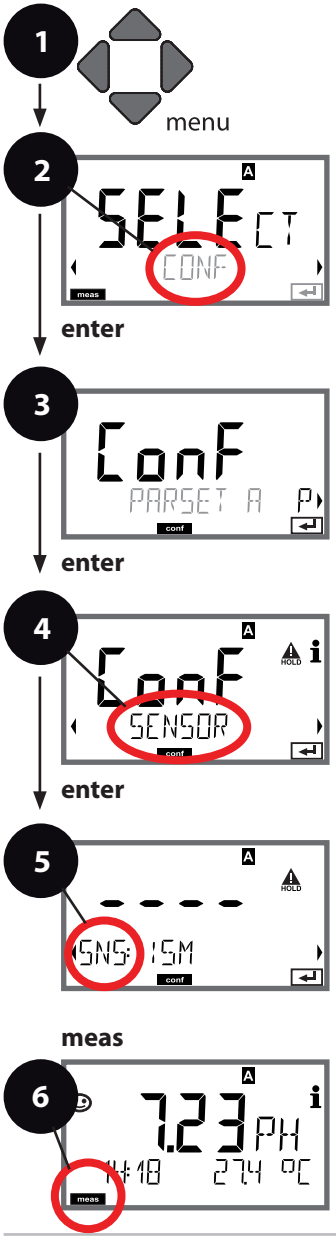
By issuing a Sensoface message, the adaptive calibration timer reminds you to calibrate the sensor. After expiration of the ACT interval, Sensoface is getting "sad". Pressing the info key shows the text "OUT OF CAL TIME CALIBRATE SENSOR" which reminds you that a calibration is due. The ACT interval is either read automatically from the sensor settings or can be specified manually (max. 9999 days). Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

The adaptive cal timer is reset after each calibration.

You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 75.

Menu item	Action	Choices
Adaptive cal timer (ACT)  	Select using ▲ ▼ keys: AUTO: The interval stored in the ISM sensor is used (default) MAN: The interval is specified manually (0 ... 9999 days) Press **enter** to confirm.	**OFF**/AUTO/MAN

ISM Sensor
Adaptive Maintenance Timer (TTM)



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Select sensor type
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
CIP/SIP cycles
Autoclaving counter

enter

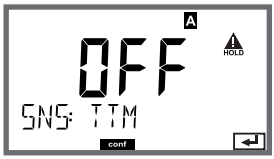
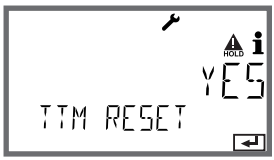
Adaptive Maintenance Timer

(TTM, Time To Maintenance)

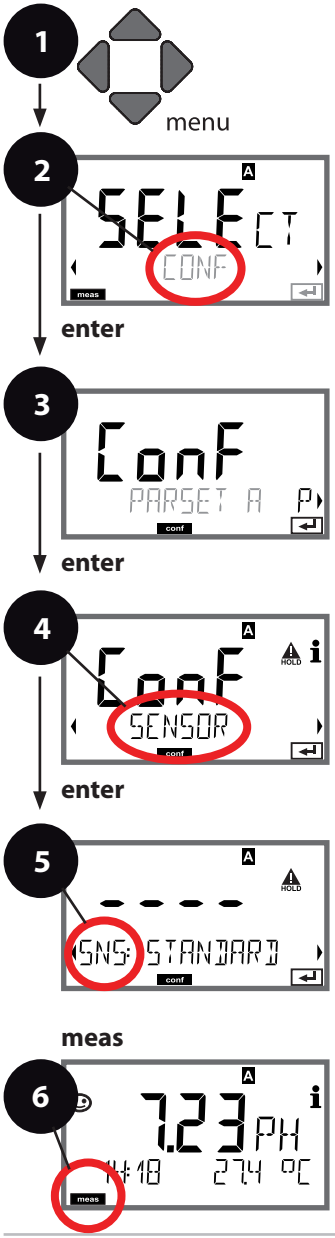
By issuing a Sensoface message, the adaptive maintenance timer reminds you to service the sensor. After expiration of the interval, Sensoface is getting "sad". Pressing the info key shows the text "OUT OF MAINTENANCE CLEAN SENSOR" which reminds you that a sensor maintenance is due. The TTM interval is either read automatically from the sensor settings or can be specified manually (max. 9999 days).

Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.

You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 75.

Menu item	Action	Choices
Adaptive maintenance timer (TTM)  	Select using ▲ ▼ keys: AUTO: The interval stored in the ISM sensor is used (default) MAN: The interval is specified manually (0 ... 9999 days) Press **enter** to confirm.	**OFF**/AUTO/MAN
The adaptive maintenance timer can be reset in the SERVICE / SENSOR / TTM menu. Here, the interval is reset to its initial value.		
	To do so, select **"TTM RESET = YES"** and confirm by pressing **enter**.	**NO** / YES

Standard and ISFET Sensor
Adjust: CIP cleaning cycles, SIP sterilization cycles

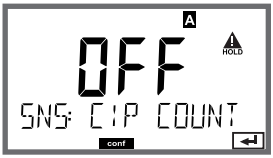
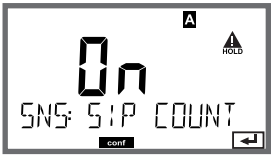


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

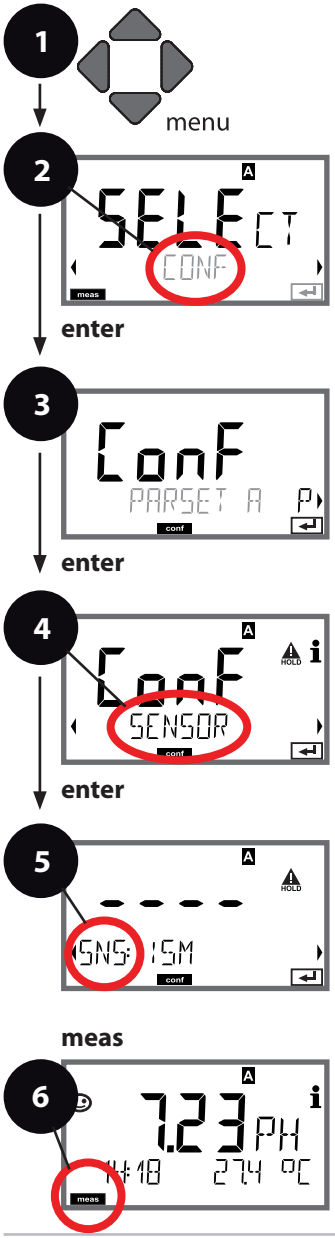
Select sensor type
Select type of temp probe
Temperature unit
Temp detection during measurement
(Man. temperature)
Temp detection during calibration
(Man. temperature)
Calibration mode
(AUTO: Buffer set)
Calibration timer
Calibration cycle
CIP cleaning cycles
SIP sterilization cycles

enter

Menu item	Action	Choices
CIP / SIP The following adjustments are possible for standard and ISFET sensors:		
Cleaning cycles 	Select ON or OFF using ▲ ▼ keys. When switched on, the cycles will be entered in the extended logbook but not counted. Press **enter** to confirm.	ON/**OFF**
Sterilization cycles 	Select ON or OFF using ▲ ▼ keys. When switched on, the cycles will be entered in the extended logbook but not counted. Press **enter** to confirm.	ON/**OFF**

Logging the cleaning and sterilization cycles with connected sensor helps measuring the load on the sensor.
Suitable for biochemical applications (process temp approx. 0 ... 50 °C, CIP temp > 55 °C, SIP temp > 115 °C).

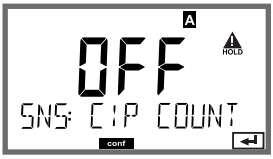
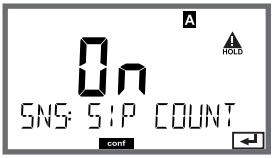
ISM Sensor
Adjust: CIP cleaning cycles, SIP sterilization cycles



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

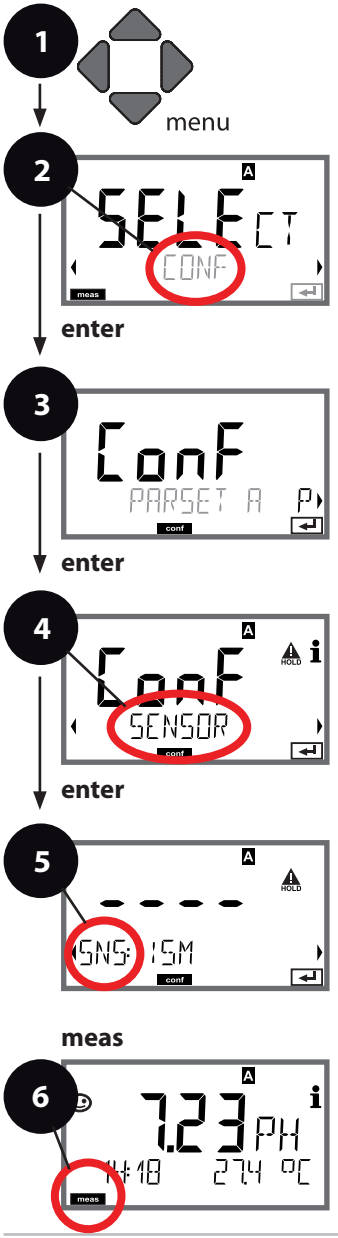
5

Select sensor type	**enter**
Temperature unit	
Temp detection during measurement	
(Manual temperature)	
Temp detection during calibration	
(Manual temperature)	
Calibration mode	
(AUTO: Buffer set)	
ACT - Adaptive calibration timer	
TTM - Adaptive maintenance timer	
Cleaning cycle counter	
Cleaning cycles	
Sterilization cycle counter	
Sterilization cycles	
Autoclaving counter	

Menu item	Action	Choices
CIP / SIP The following adjustments are possible for ISM sensors :		
Cleaning cycle counter 	Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm.	ON/**OFF**
Cleaning cycles 	Only with CIP COUNT ON: Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 CYC (**0000 CYC**)
Sterilization cycle counter 	Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm.	ON/**OFF**
Sterilization cycles 	Only with CIP COUNT ON: Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...9999 CYC (**0000 CYC**)

The cleaning and sterilization cycles are counted to measure the load on the sensor.
Suitable for biochemical applications (process temp approx. 0...50 °C, CIP temperature > 55 °C, SIP temperature > 115 °C).

ISM Sensor
Autoclaving counter



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **SENSOR** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "SNS:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Select sensor type
Temperature unit
Temp detection during measurement
(Manual temperature)
Temp detection during calibration
(Manual temperature)
Calibration mode
(AUTO: Buffer set)
ACT - Adaptive calibration timer
TTM - Adaptive maintenance timer
CIP/SIP cycles
Autoclaving counter

enter

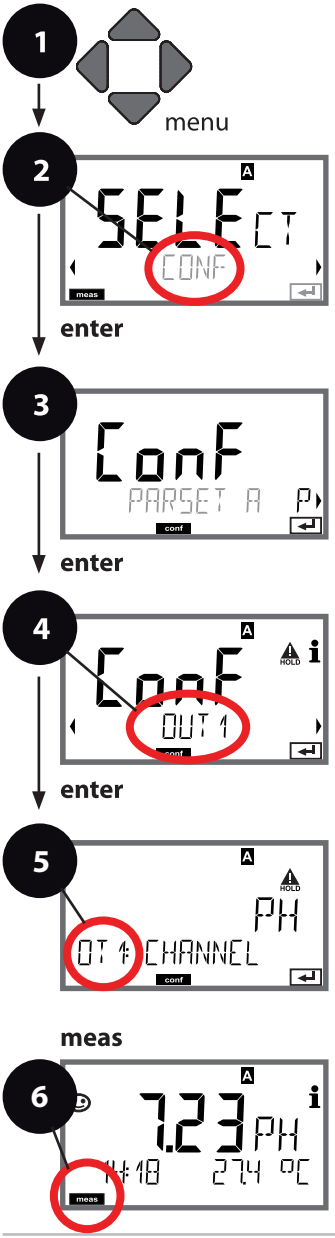
Autoclaving Counter

After reaching a specified limit value the autoclaving counter generates a Sensoface message. As soon as the counter has reached the specified value, Sensoface is getting "sad". Pressing the info key shows the text "AUTOCLAVE CYCLES OVERRUN" which reminds you that the maximum number of autoclaving cycles has been reached. After each autoclaving process, you must manually increment the autoclaving counter in the SENSOR service menu on the transmitter. The transmitter displays "INCREMENT AUTOCLAVE CYCLE" as confirmation. You can configure the current outputs so that a Sensoface message generates a 22-mA error signal, see page 75.

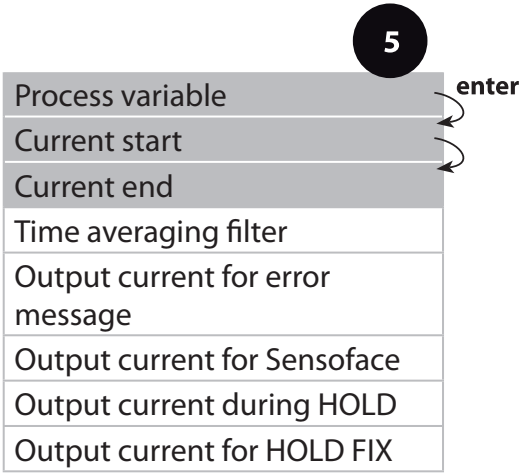
Menu item	Action	Choices
Autoclaving counter 	Select using ▲ ▼ keys: ON: The cycles are specified manually (0 ... 9999) Press **enter** to confirm.	**OFF**/ON
With the autoclaving counter switched on, you must increment the count after each autoclaving process in the SERVICE menu SENSOR/ AUTOCLAVE :		
Incrementing the autoclaving counter (SERVICE menu) 	After having completed an autoclaving process, open the SERVICE menu SENSOR / AUTOCLAVE to increment the autoclaving count. To do so, select "**YES**" and confirm by pressing **enter**.	**NO** / YES

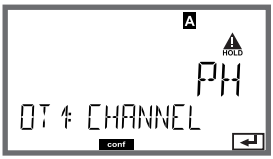
Current Output 1

Output current range. Current start. Current end.



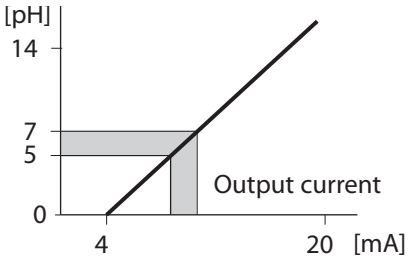
1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **OUT1** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "OT1:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



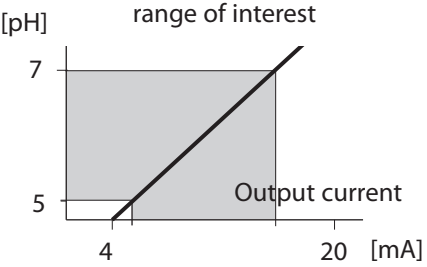
Menu item	Action	Choices
Process variable 	Select using ▲ ▼ keys: PH: pH value ORP: Redox potential TMP: Temperature Press **enter** to confirm.	**PH**/ORP/TMP
Current start 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	–2...16 pH (PH) –1999...1999 mV (ORP) –20...300 °C / –4...572 °F (TMP)
Current end 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	–2...16 pH (PH) –1999...1999 mV (ORP) –20...300 °C / –4...572 °F (TMP)

Assignment of measured values: Current start and current end

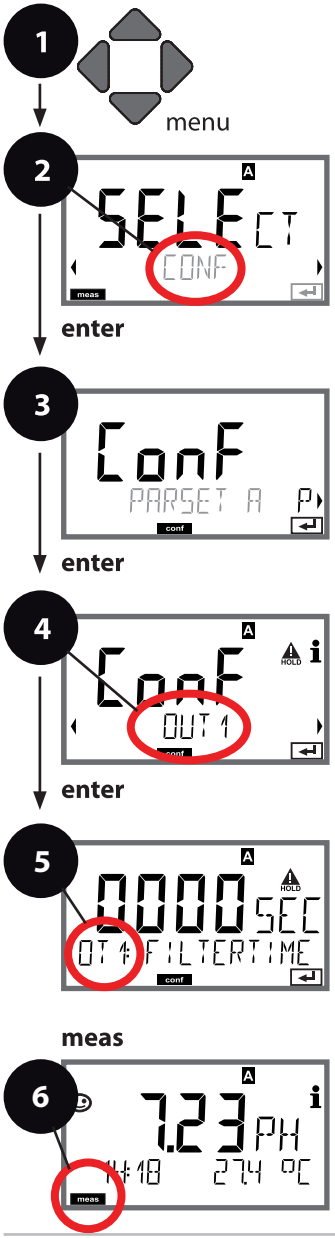
Example 1: Range pH 0...14



Example 2: Range pH 5...7
Advantage: Higher resolution in range of interest



Current Output 1
Adjusting the time interval of the output filter

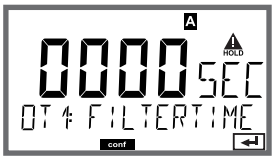


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **OUT1** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "OT1:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Process variable
Current start
Current end
Time averaging filter
Output current during error message
Output current for Sensoface
Output current during HOLD
Output current for HOLD FIX

enter

Menu item	Action	Choices
Time averaging filter 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...120 SEC (**0000 SEC**)

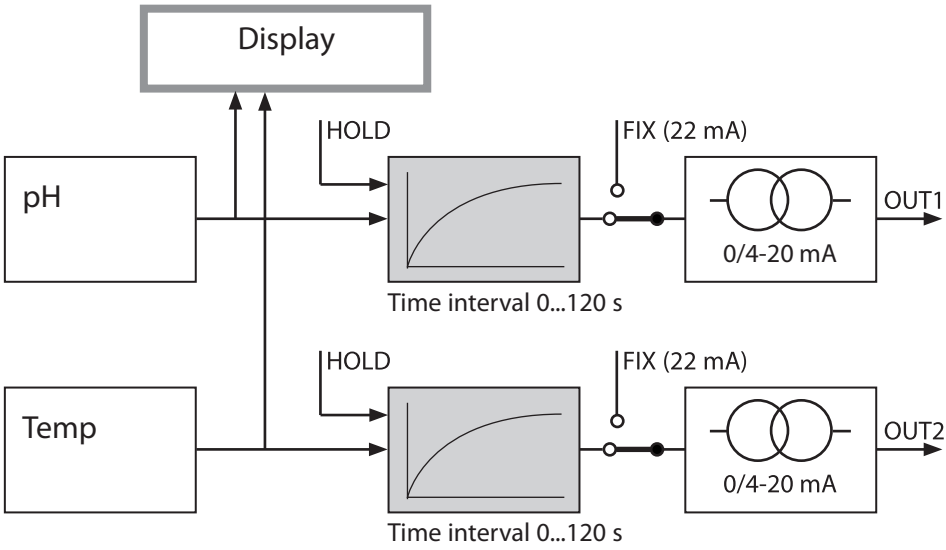
Time averaging filter

To smoothen the current output, a low-pass filter with adjustable filter time constant can be switched on. When there is a jump at the input (100 %), the output level is at 63 % after the time interval has been reached. The time interval can be set from 0 to 120 sec. If the time interval is set to 0 sec, the current output directly follows the input.

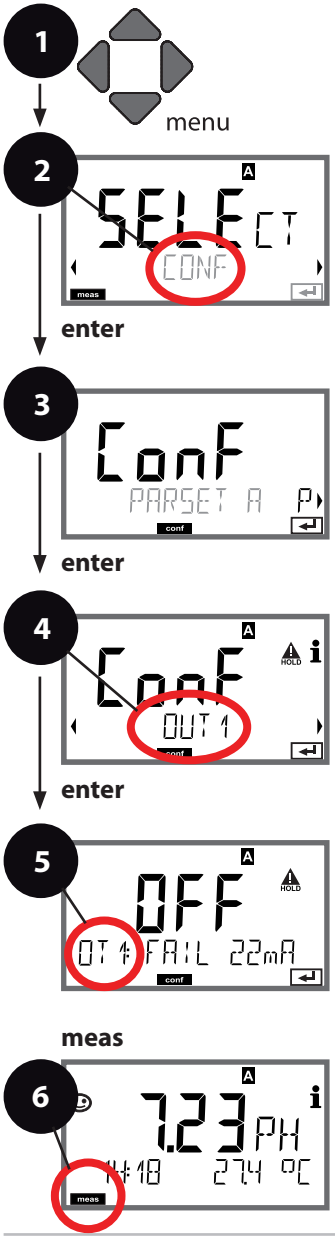
Please note:

The filter only acts on the current output, not on the display or the limit value!

During HOLD the filter is not applied. This prevents a jump at the output.



Current Output 1
Output current for error message or Sensoface alert

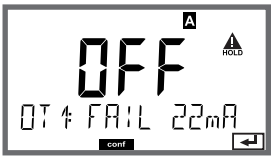


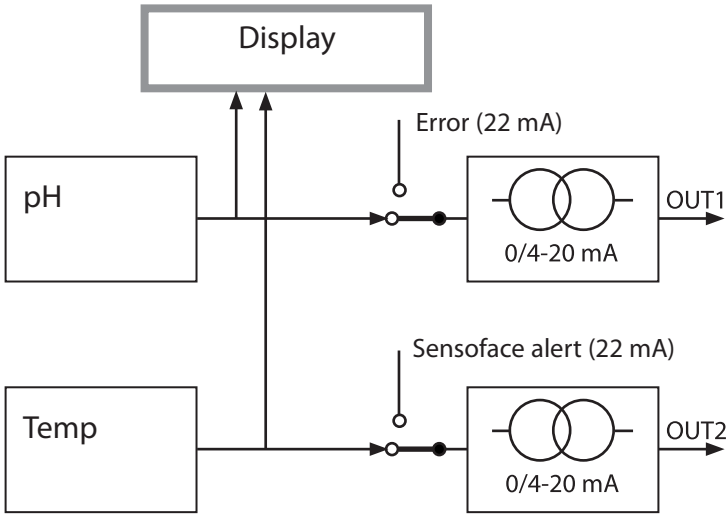
1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **OUT1** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "OT1:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Process variable
Current start
Current end
Time averaging filter
Output current for error message
Output current for Sensoface
Output current during HOLD
Output current for HOLD FIX

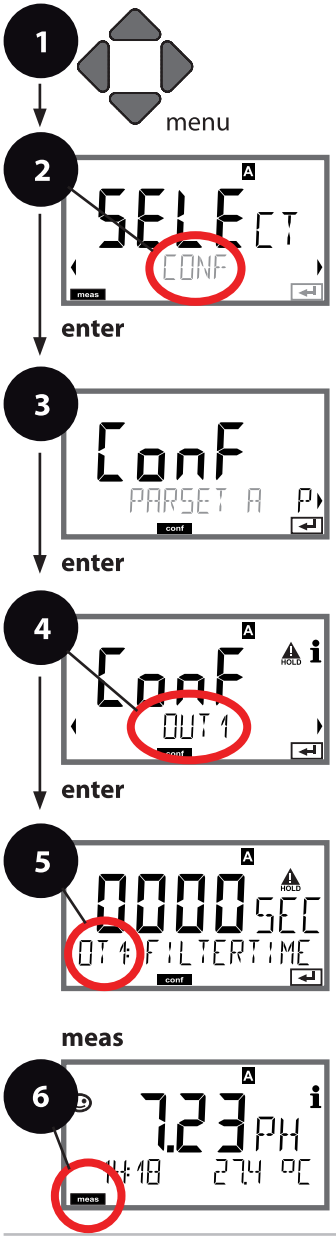
enter

Menu item	Action	Choices
Output current for error message (FAIL) 	In the case of an error (FAIL), the current output is set to 22 mA. Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm.	ON/**OFF**
Output current for Sensoface (FACE) 	In the case of a Sensoface alert (FACE), the current output is set to 22 mA. Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm.	ON/**OFF**



Error messages and Sensoface alerts can be set separately for both current outputs. This allows, for example, signaling error messages only over current output 1 and Sensoface alerts only over current output 2.

Current Output 1
Output current during HOLD

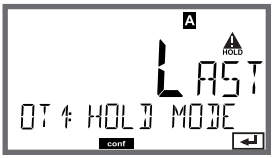


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **OUT1** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "OT1:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

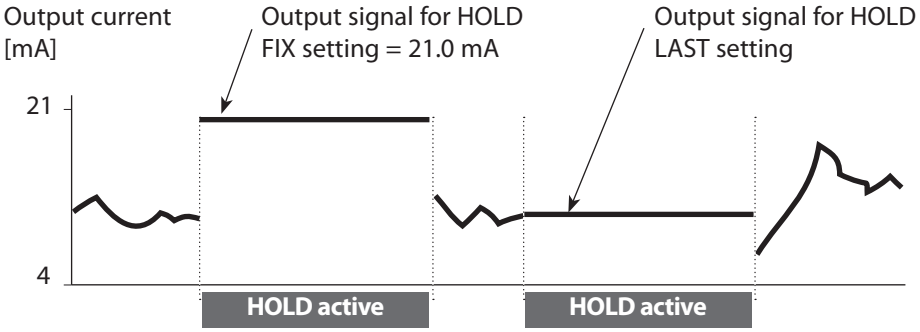
5

Process variable
Current start
Current end
Time averaging filter
Output current for error message
Output current for Sensoface
Output current during HOLD
Output current for HOLD FIX

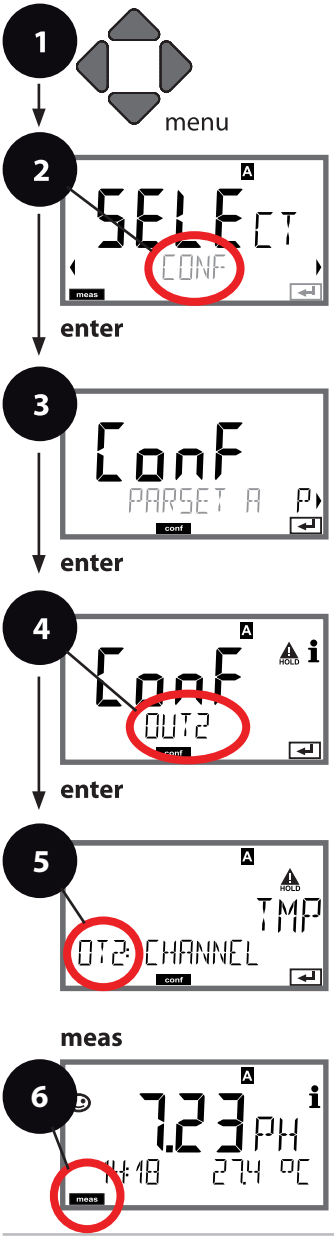
enter

Menu item	Action	Choices
Output current during HOLD 	LAST: During HOLD the last measured value is maintained at the output. FIX: During HOLD a value (to be entered) is maintained at the output. Select using ▲ ▼ Press **enter** to confirm.	**LAST**/FIX
Output current for HOLD FIX	Only with FIX selected: Enter current which is to flow at the output during HOLD Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	00.00...22.00 mA (**21.00 mA**)

Output signal during HOLD:



Current Output 2
Process variable. Current start. Current end ...

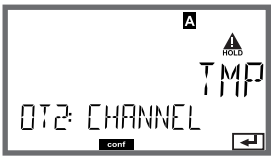


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **OUT2** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "OT2:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) by pressing **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

5

Process variable
Current start
Current end
Time averaging filter
Output current for error message
Output current for Sensoface
Output current during HOLD
Output current for HOLD FIX

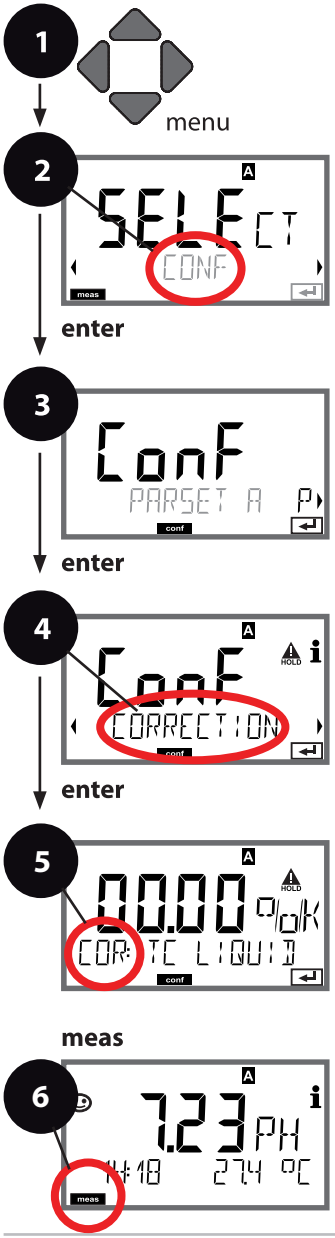
enter

Menu item	Action	Choices
Process variable 	Select using ▲ ▼ keys: PH: pH value ORP: Redox potential TMP: Temperature Press **enter** to confirm.	PH/ORP/**TMP**
. . .		

All the following adjustments are made as for current output 1 (see pg 70)!

Temperature Compensation

TC process medium: Linear, ultrapure water, table

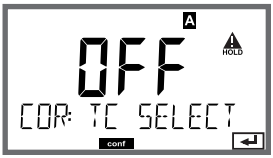
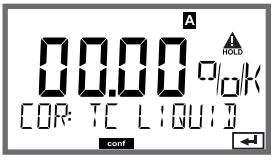
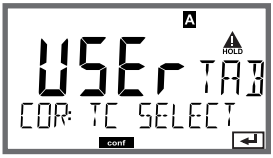
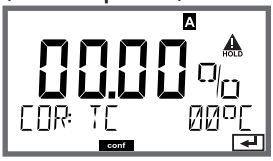
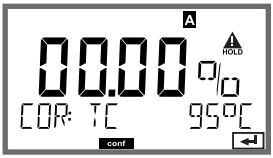


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **CORRECTION** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "COR:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

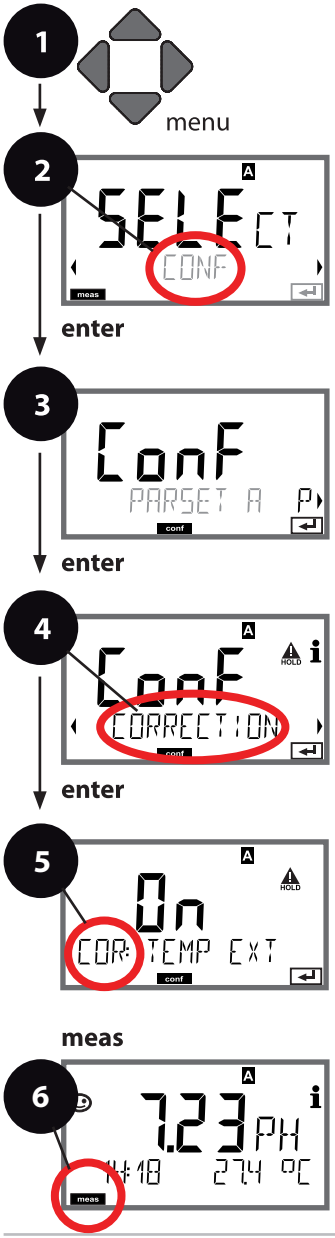
5

Temperature compensation for process medium
Current input, external temp measurement
Current range
Current start
Current end

enter

Menu item	Action	Choices
Temp compensation, process medium 	For pH measurement only: Select temperature compensation of the process medium. Linear: LIN Ultrapure water: PUREWTR Table: USERTAB Select using ◀ ▶ key, proceed using **enter**.	**OFF**/LIN/PUREWTR/ USERTAB
Temp compensation, linear 	Enter the linear temperature compensation of the process medium. Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	–19.99...+19.99 %/K
Temp compensation, table  Confirm safety prompt, then enter values (5°C step size)  	When you have selected temperature compensation via table (USERTAB), you can enter values for a TC table from 0 to 95 °C in 5-K steps. The analyzer displays temperature values in 5 °C steps. You must specify the percent deviation of the measured value from each of these temperature values. Intermediate values are linearly interpolated. TC compensation can be defined separately for parameter sets A and B.	0 ... 95 °C (5°C step size)

Temperature Compensation
Current input, external temp measurement

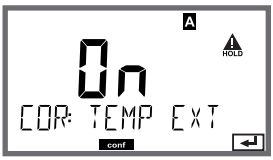
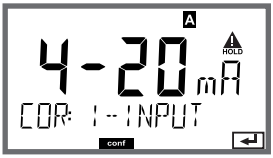
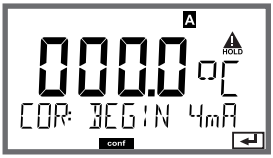
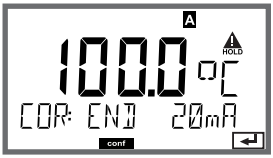


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸ keys, press **enter**.
4) Select **CORRECTION** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "COR:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

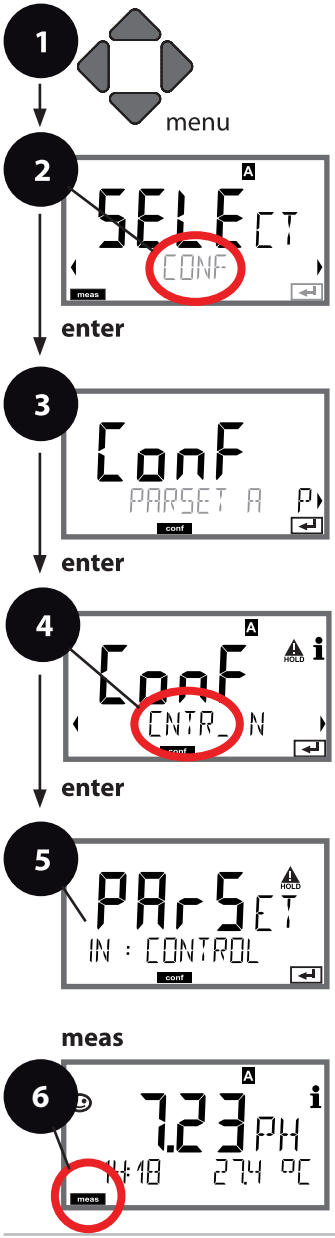
5

Temperature compensation for process medium
Current input, external temp measurement
Current range
Current start
Current end

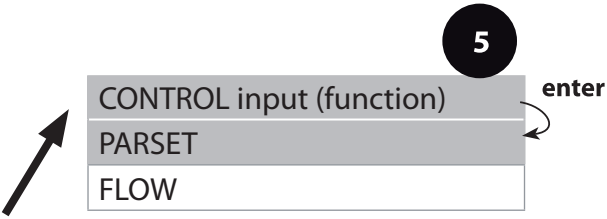
enter

Menu item	Action	Choices
Current input, external temp measurement 	Only if enabled via TAN and selected during configuration (SENSOR). Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm.	**ON**/OFF
Current range 	Select desired range using ▲ ▼ keys. Press **enter** to confirm.	**4-20 mA** / 0-20 mA
Current start 	Modify digit using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	Input range: –20...200 °C / –4...392 °F
Current end 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	Input range: –20...200 °C / –4...392 °F

CONTROL Input
Parameter set selection via external signal



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **CNTR_IN** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "IN:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



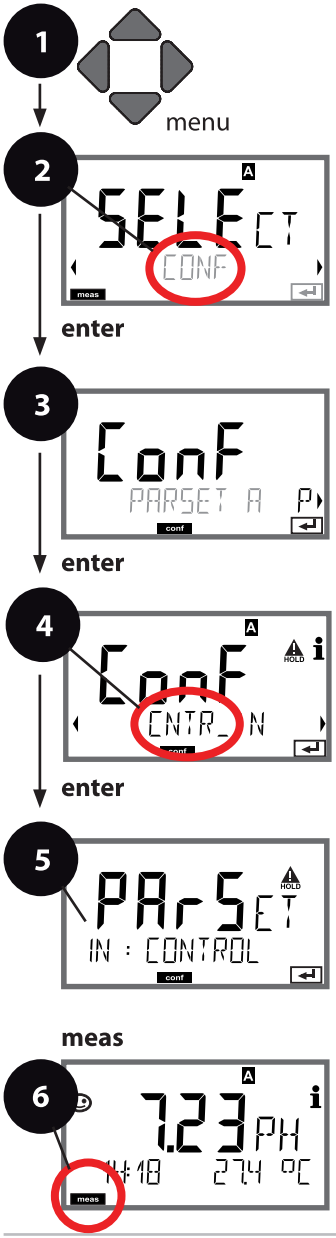
Menu item	Action	Choices
Select function of CONTROL input	Select using ◂ ▸ keys. Press **enter** to confirm.	**PARSET FIX A /** MANUAL / CNTR INPUT (selecting parameter set A/B via signal at CONTROL input)

External switchover of parameter sets

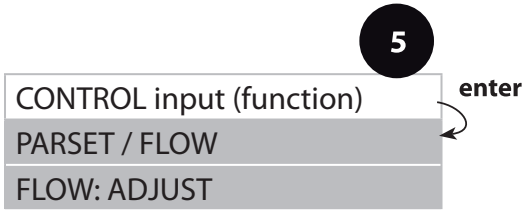
The parameter set A/B can be activated from outside by sending a signal to the CONTROL input (e.g. from the process control system).

Parameter set A	0...2 V AC/DC
Parameter set B	10...30 V AC/DC

CONTROL Input
Flow measurement



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **CNTR_IN** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "IN:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



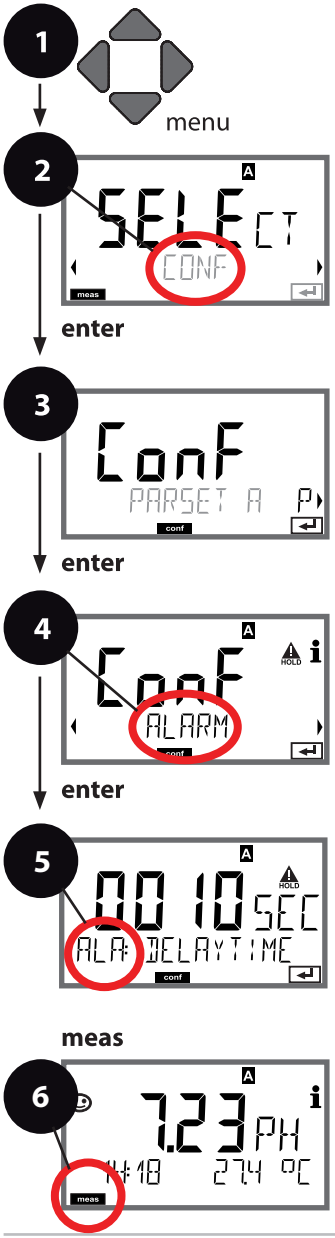
Menu item	Action	Choices
Select function of CONTROL input	Select using ▲ ▼ keys. Press **enter** to confirm.	**PARSET** (selecting parameter set A/B via signal at CONTROL input)
		Flow (for connecting a pulse-output flow meter)
Adjust to flow meter:	**With "Flow" selected**, you must adjust the device to the flow meter used. Enter value using arrow keys. Press **enter** to confirm.	**12000 pulses/liter**

In the alarm menu you can configure flow monitoring. When you have set CONTROL to FLOW, you can specify 2 additional limit values for maximum and minimum flow.
If the measured value lies outside this range, an alarm message and a 22-mA error signal (if configured) will be generated.

Display
Flow measurement in measuring mode

Display
Flow measurement (sensor monitor)

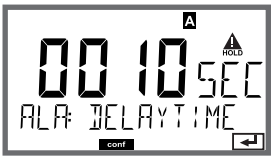
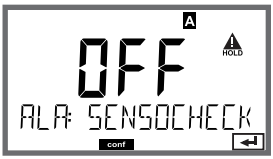
Alarm Settings
Alarm delay. Sensocheck.



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **ALARM** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "ALA:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

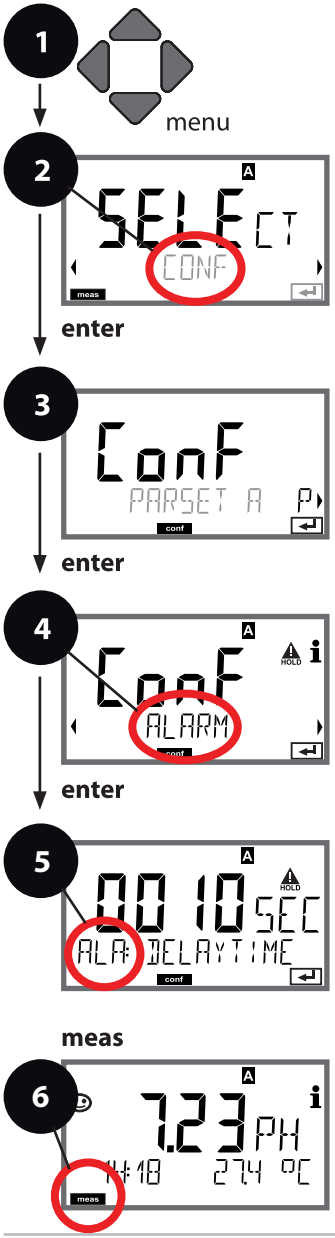
5

Delay	enter
Sensocheck	
Alarm: CONTROL input	
For flow monitoring: Max. flow alarm	
For flow monitoring: Min. flow alarm	

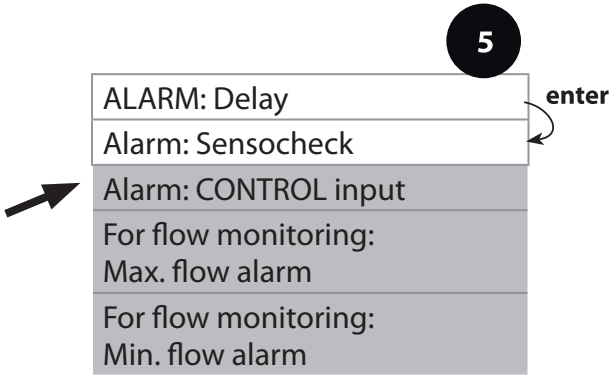
Menu item	Action	Choices
Alarm delay 	Enter value using ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.	0...600 SEC (**010 SEC**)
Sensocheck 	Select Sensocheck (continuous monitoring of glass and reference electrode) Select ON or OFF using ▲ ▼ keys. Press **enter** to confirm. (At the same time, Sensoface is activated. With OFF, Sensoface is also switched off.)	ON/**OFF**

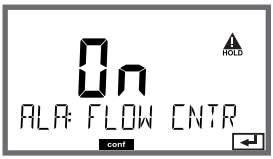
Error messages can be signaled by a 22 mA output current (see Error Messages and Configuration of Output 1/Output 2).
The alarm delay time delays the color change of the display backlighting to red and the 22 mA signal (if configured).

Alarm Settings
CONTROL input (FLOW MIN, FLOW MAX)

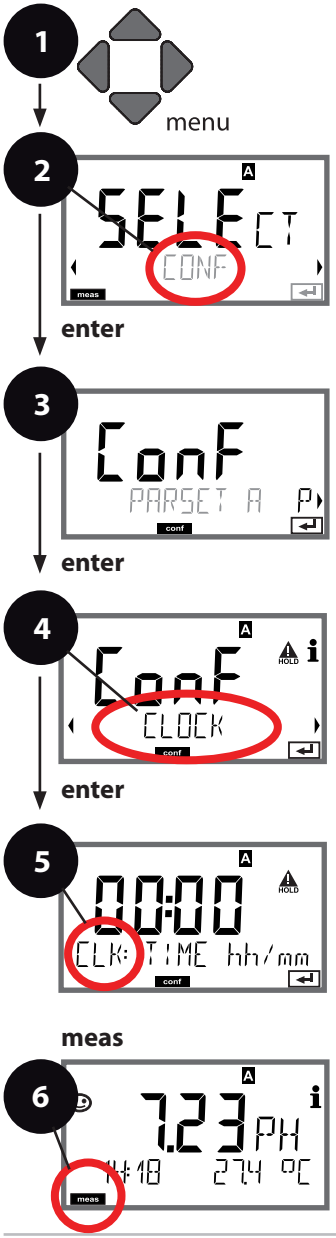


1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set using ◂ ▸, press **enter**.
4) Select **ALARM** menu using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "ALA:" code.
   Press **enter** to select menu,
   edit using arrow keys (see next page).
   Confirm (and proceed) using **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.

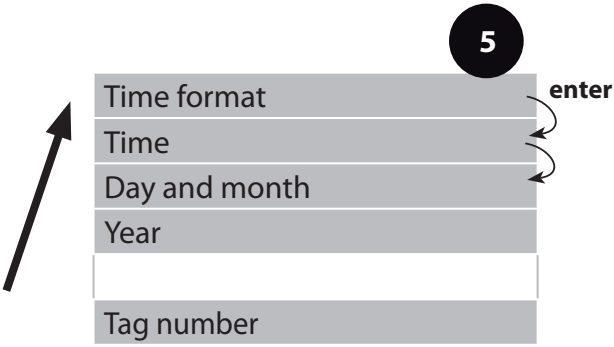


Menu item	Action	Choices
CONTROL input 	The **CONTROL input** can generate an alarm when assigned to FLOW (flow monitoring) in the CONF menu: **FLOW CNTR** **Flow measurement:** allows monitoring the minimum and maximum flow (pulse counter)	ON/**OFF** (FLOW MIN, FLOW MAX.)
Alarm Minimum flow **FLOW MIN**	Specify value	Default: 05.00 liters/h
Alarm Maximum flow **FLOW MAX**	Specify value	Default: 25.00 liters/h

Time and Date
Tag Number



1) Press **menu** key.
2) Select **CONF** using ◂ ▸ keys, press **enter**.
3) Select parameter set A using ◂ ▸ keys, press **enter**.
4) Select **CLOCK** or **TAG** using ◂ ▸ keys, press **enter**.
5) All items of this menu group are indicated by the "CLK:" or "TAG" code.
   Press **enter** to select menu,
   edit with arrow keys (see next page).
   Confirm (and proceed) with **enter**.
6) Exit: Press **meas** key until the [meas] mode indicator is displayed.



Time and Date

Control of the calibration and cleaning cycles is based on the time and date of the integrated real-time clock.
In measuring mode the time is shown in the lower display.
When using digital sensors, the calibration data is written in the sensor head.
In addition, the logbook entries (cf Diagnostics) are provided with a time stamp.

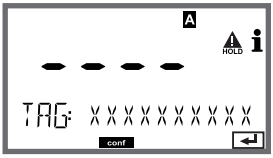
Please note:

- After prolonged power outage (> 5 days) the time display is replaced by dashes and cannot be used for processing.
  Enter the correct time.
- There is no automatic switchover from winter to summer time!
  Be sure to manually adjust the time!

Tag Number (" TAG")

You can enter a designation for the point of measurement (tag number) in the lower display line. Up to 32 digits are possible.
Pressing **meas** (repeatedly) in the measuring mode indicates the tag number.
Being part of the device configuration, the "TAG" can be read out via IrDA.
A standardized tag number helps, for example, to correctly re-install a device after repair.

5

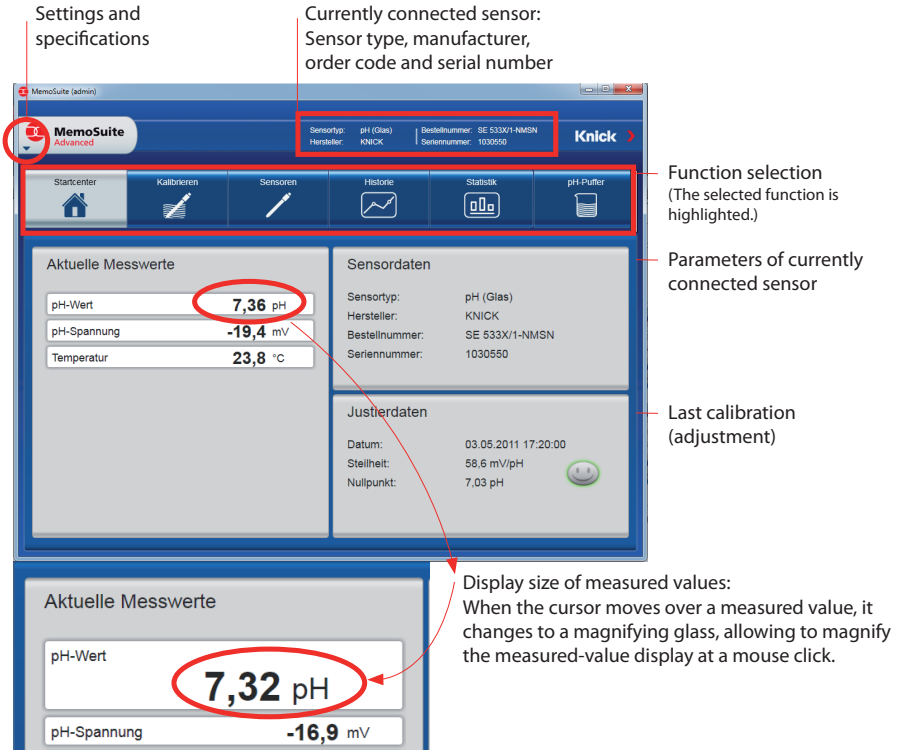
Menu item	Action	Choices
Tag number 	Select character using ▲ ▼ keys, select next digit using ◀ ▶ keys. Press **enter** to confirm.	A...Z, 0...9, – + < > ? / @ The first 10 characters are seen in the display without scrolling.

Digital Sensors

Stratos Pro can be operated with digital sensors. Due to the galvanic isolation of Memosens sensors, earth or ground potentials have no effect here. Therefore, a Solution Ground or measures for equipotential bonding are not required.
Digital sensors can be calibrated and maintained in the lab.
This considerably simplifies on-site maintenance.

Memosens Sensors: Calibration and Maintenance in the Lab

The "MemoSuite" software allows calibrating Memosens sensors under reproducible conditions at a PC in the lab. The sensor parameters are registered in a database. Documenting and archiving meet the demands of FDA CFR 21 Part 11. Detailed reports can be output as csv export for Excel.



Calibration history of several sensors

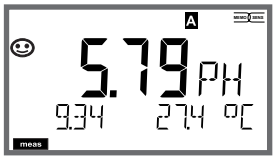
History: Load diagrams of the sensors

The comprehensive display options of the software allow drawing conclusions on the aging behavior of the sensors at one glance and making a reliable forecast for predictive maintenance.

The software is available as "Basic" (calibration function) or "Advanced" (with sensor database) version: www.knick.de

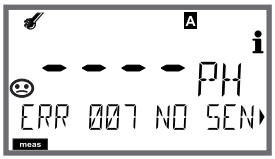
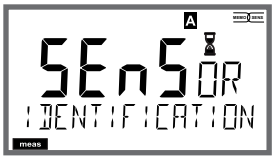
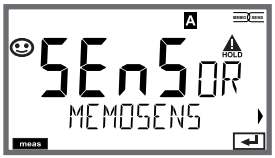
Memosens Sensors: Configuring the Device

The sensor type is selected during **Configuration**.
The device only switches to measuring mode when the connected sensor corresponds to the type configured (Sensoface is friendly):



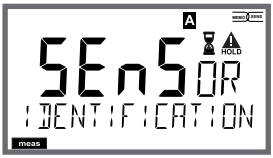
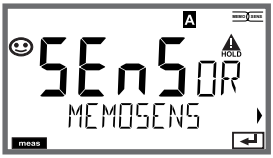
Otherwise, an error message is released. The **info** icon is displayed. You can display the error text in the bottom line using the ◀ ▶ keys.

Connecting a Digital Sensor

Step	Action/Display	Remark
Connect sensor		Before a digital sensor is connected, the error message “No sensor“ is displayed.
Wait until the sensor data are displayed.		The hourglass in the display blinks.
Check sensor data	 View sensor information using ◀ ▶ keys, press **enter** to confirm.	Display color changes to **green**. Sensoface is friendly when the sensor data are okay.
Go to measuring mode	Press **meas**, **info** or **enter**	After 60 sec the device automatically returns to measuring mode (time-out).

Replacing a Sensor

A sensor should only be replaced during HOLD mode to prevent unintended reactions of the outputs or contacts. When you first want to calibrate the new sensor, it can also be replaced in calibration mode.

Step	Action/Display	Remark
Select HOLD mode	Press **menu** key to call the selection menu, select HOLD using the ◀ ▶ keys, press **enter** to confirm.	Now the device is in HOLD mode. The HOLD mode can also be activated externally via the HOLD input. During HOLD the output current is frozen at its last value or set to a fixed value.
Disconnect old sensor, connect new sensor.		Temporary messages are displayed during the replacement but neither output to the alarm contact nor entered in the logbook.
Wait until the sensor data are displayed.		
Check sensor data	 View sensor information using ◀ ▶ keys, press **enter** to confirm.	You can view the sensor manufacturer and type, serial number, and last calibration date.
Check measured values, then exit HOLD.	Hit **meas** key: Return to the selection menu. Hold **meas** key depressed: Device switches to measuring mode.	The sensor replacement is entered in the extended logbook.

Calibration

Please note:

- All calibration procedures must be performed by trained personnel. Incorrectly set parameters may go unnoticed, but change the measuring properties.

- The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.

- The device can only operate properly when the buffer solutions used correspond to the configured set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response. This leads to measurement errors.

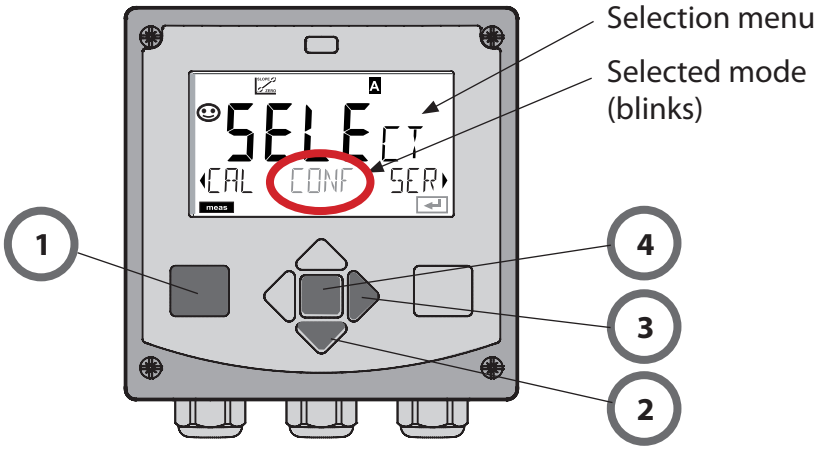
When using ISFET sensors or sensors with a zero point other than pH 7, the nominal zero point must be adjusted each time a new sensor is connected. This is important if you want to obtain reliable Sensoface messages. The Sensoface messages issued during all further calibrations are based on this basic calibration.

Selecting a Calibration Mode

Calibration is used to adapt the device to the individual sensor characteristics, namely asymmetry potential and slope.
Access to calibration can be protected with a passcode (SERVICE menu).
First, you open the calibration menu and select the calibration mode:

CAL_PH	Depending on configuation setting:	
	AUTO	Automatic buffer recognition (Calimatic)
	MAN	Manual buffer input
	DAT	Input of premeasured electrode data
CAL_ORP	ORP calibration	
P_CAL	Product calibration (calibration with sampling)	
ISFET-ZERO	Zero adjustment. Required for ISFET sensors, subsequently you can conduct either a one or a two-point calibration.	
CAL_RTD	Temperature probe adjustment	

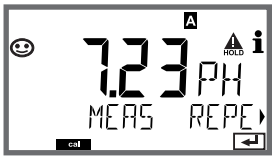
To preset CAL_PH (CONF menu / configuration):
1) Hold **meas** key depressed (> 2 s) (measuring mode)
2) Press **menu** key: the selection menu appears
3) Select CONF mode using left / right arrow key
4) Select "SENSOR" – "CALMODE": AUTO, MAN, or DAT.
   Press **enter** to confirm



Zero Adjustment (ISFET)

This adjustment allows the use of ISFET sensors with differing nominal zero (pH only). The function is available when Sensor selection = ISFET has been set during configuration. Zero adjustment is disabled for any other sensors.
The adjustment is made using a zero buffer (pH 7.00).
Permitted range for buffer value: pH 6.5 ... 7.5.
Temperature-corrected input. Maximum zero offset: ± 200 mV.

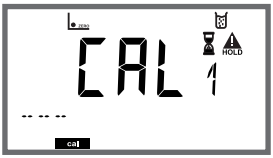
Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Immerse sensor in a pH 7.00 buffer. Enter the temperature-corrected pH value in the range 6.50 to 7.50 using the arrow keys (see buffer table). Confirm with **enter.**	If the zero offset of the sensor is too large (> ± 200 mV), a CAL ERR error message is generated. In that case the electrode cannot be calibrated.
	Stability check. The measured value [mV] is displayed. The "hourglass" icon is blinking.	Please note: Stability check can be stopped (by pressing **enter**). However, this reduces calibration accuracy.

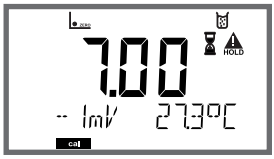
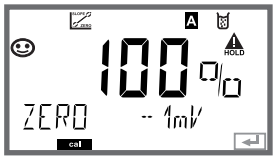
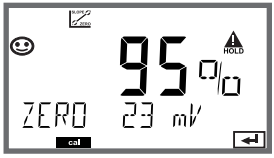
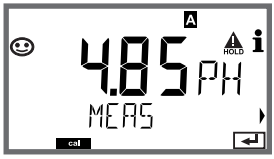
Display	Action	Remark
	At the end of the adjustment procedure the zero offset [mV] of the sensor is displayed (based on 25 °C). Sensoface is active. Press **enter** to proceed.	This is not the final calibration value of the sensor! Asymmetry potential and slope must be determined with a complete 2-point calibration.
	Use the arrow keys to select: • Repeat (repeat calibration) or • Measuring. Confirm by pressing **enter**.	
	Place sensor in process. Press **enter** to end zero calibration.	After end of calibration, the outputs remain in HOLD mode for a short time.

Note for zero adjustment
After having adjusted the zero offset, be sure to calibrate the sensor following one of the procedures as described on the next pages.

Automatic Calibration (Calimatic)

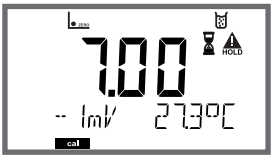
The AUTO calibration mode and the type of temperature detection are selected during **configuration**. Make sure that the buffer solutions used correspond to the configured buffer set. Other buffer solutions, even those with the same nominal values, may demonstrate a different temperature response. This leads to measurement errors.

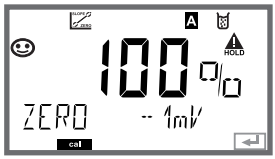
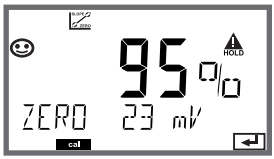
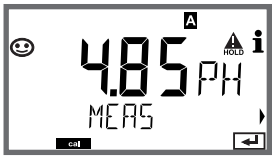
Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks. Select calibration method: CAL_PH Press **enter** to proceed.	Display (3 sec) Now the device is in HOLD mode.
	Remove the sensor and temperature probe, clean them, and immerse them in the first buffer solution (in any order). Start by pressing **enter**	When manual input of temperature has been configured, the temp value in the display blinks and can be edited using the arrow keys.
 	Buffer recognition. While the "hourglass" icon is blinking, the sensor and temperature probe remain in the first buffer solution. Buffer recognition terminated, the nominal buffer value is displayed.	The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.

Display	Action	Remark
	At the end of the stability check, the value will be saved and the asymmetry potential will be displayed. Calibration with the first buffer is terminated. Remove the sensor and temp probe from the first buffer solution and rinse them thoroughly. **Use the arrow keys to select:** • END (1-point cal) • CAL2 (2-point cal) • REPEAT Press **enter** to proceed.	Please note: Stability check can be stopped after 10 sec (by pressing **enter**). However, this reduces calibration accuracy. Display for 1-point cal:  Sensoface is active. End by pressing **enter**
	2-point calibration: Immerse sensor and temperature probe in the second buffer solution. Press **enter** to start.	The calibration process runs as for the first buffer.
	Retract sensor and temp probe out of second buffer, rinse off, re-install. Press **enter** to proceed.	The slope and asymmetry potential of the sensor (based on 25 °C) are displayed.
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed. Exit: HOLD is deactivated with delay.	When 2-point cal is ended:

Manual Calibration with Buffer Entry

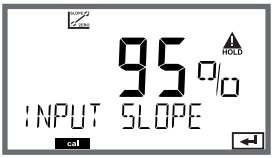
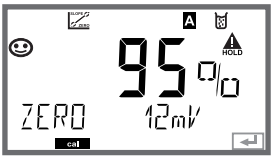
The MAN calibration mode and the type of temperature detection are selected during **configuration**. For calibration with manual buffer specification, you must enter the pH value of the buffer solution used in the device for the proper temperature. Any desired buffer solution can be used for calibration.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Remove the sensor and temperature probe, clean them, and immerse them in the first buffer solution. Press **enter** to start.	When manual input of temperature has been configured, the temp value in the display blinks and can be edited using the arrow keys.
  	Enter the pH value of your buffer solution for the proper temperature. While the "hourglass" icon is blinking, the sensor and temperature probe remain in the buffer solution.	The response time of the sensor and temperature probe is considerably reduced when the sensor is first moved about in the buffer solution and then held still.

Display	Action	Remark
	At the end of the stability check, the value will be saved and the asymmetry potential will be displayed. Calibration with the first buffer is terminated. Remove the sensor and temp probe from the first buffer solution and rinse them thoroughly. **Use the arrow keys to select:** • END (1-point cal) • CAL2 (2-point cal) • REPEAT Press **enter** to proceed.	Please note: Stability check can be stopped after 10 sec (by pressing **enter**). However, this reduces calibration accuracy. Display for 1-point cal:  Sensoface is active. End by pressing **enter**
	2-point calibration: Immerse sensor and temperature probe in the second buffer solution. Enter pH value. Press **enter** to start.	The calibration process runs as for the first buffer.
	Rinse sensor and temperature probe and reinstall them. Press **enter** to proceed.	Display of slope and new asymmetry potential (based on 25 °C).
	**Use the arrow keys to select:** • MEAS (exit) • REPEAT Press **enter** to proceed. Exit: HOLD is deactivated with delay.	When 2-point cal is ended:

Data Entry of Premeasured Sensors

The DAT calibration mode must have been preset during configuration.
You can directly enter the values for slope and asymmetry potential of a sensor. The values must be known, e.g. determined beforehand in the laboratory.

Display	Action	Remark
	Select Calibration. Press **enter** to proceed.	
	"Data Input" Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Enter asymmetry potential [mV]. Press **enter** to proceed.	
	Enter slope [%].	
	The device displays the new slope and asymmetry potential (at 25 °C). Sensoface is active.	
	Use the arrow keys to select: • MEAS (exit) • REPEAT Press **enter** to proceed.	Exit: HOLD is deactivated with delay.

Converting slope [%] to slope [mV/pH] at 25 °C

%	mV/pH
78	46.2
80	47.4
82	48.5
84	49.7
86	50.9
88	52.1
90	53.3
92	54.5
94	55.6
96	56.8
98	58.0
100	**59.2**
102	60.4

Converting asymmetry potential to sensor zero point

$$ZERO = 7 - \frac{V_{AS}[mV]}{S\ [mV / pH]}$$

ZERO = Sensor zero

V_{AS} = Asymmetry potential

S = Slope

Product Calibration (pH)

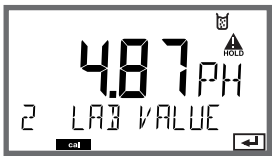
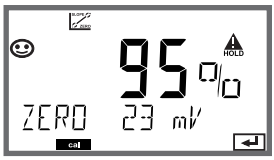
Calibration by sampling (one-point calibration).
During product calibration the sensor remains in the process.
The measurement process is only interrupted briefly.

Procedure:

1) The sample is measured in the lab or directly on the site using a portable meter. To ensure an exact calibration, the sample temperature should correspond to the measured process temperature.
   During sampling the device saves the currently measured value and then returns to measuring mode. The "calibration" mode indicator blinks.
2) In the second step you enter the measured sample value in the device. From the difference between the stored measured value and entered sample value, the device calculates the new asymmetry potential.

If the sample is invalid, you can take over the value stored during sampling. In that case the old calibration values are stored.
Afterwards, you can start a new product calibration.

Display	Action	Remark
	Select product calibration: P_CAL. Press **enter** to proceed.	
	Ready for calibration. Hourglass blinks.	Display (3 sec) Now the device is in HOLD mode.
	Take sample and save value. Press **enter** to proceed.	Now the sample can be measured.

Display	Action	Remark
	The device returns to measuring mode.	From the blinking CAL mode indicator you see that product calibration has not been terminated.
	Product calibration step 2	Display (3 sec) Now the device is in HOLD mode.
	The stored value is displayed (blinking) and can be overwritten with the measured sample value. Press **enter** to proceed.	
	Display of new asymmetry potential (based on 25°C). Sensoface is active. To exit calibration: Select MEAS, then press **enter**	To repeat calibration: Select REPEAT, then press **enter**
End of calibration	After end of calibration, the outputs remain in HOLD mode for a short time.	

ORP (Redox) Calibration

The potential of a redox sensor is calibrated using a redox (ORP) buffer solution. In the course of that, the difference between the measured potential and the potential of the calibration solution is determined according to the following equation. During measurement this difference is added to the measured potential.

$$mV_{ORP} = mV_{meas} - \Delta mV$$

mV_{ORP} = displayed ORP

mV_{meas} = direct sensor potential

ΔmV = delta value, determined during calibration

The sensor potential can also be related to another reference system – e.g. the standard hydrogen electrode. In that case the temperature-corrected potential (see table) of the reference electrode used must be entered during calibration. During measurement, this value is then added to the ORP measured.
Please make sure that measurement and calibration temperature are the same since the temperature behavior of the reference electrode is not automatically taken into account.

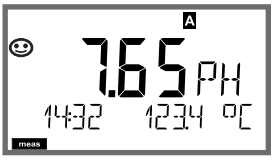
Temperature dependence of commonly used reference systems measured against SHE

Temperature [°C]	Ag/AgCl/KCl 1 mol/l [ΔmV]	Ag/AgCl/KCl 3 mol/l [ΔmV]	Thalamid [ΔmV]	Mercury sulfate [ΔmV]
0	249	224	-559	672
10	244	217	-564	664
20	240	211	-569	655
25	236	207	-571	651
30	233	203	-574	647
40	227	196	-580	639
50	221	188	-585	631
60	214	180	-592	623
70	207	172	-598	613
80	200	163	-605	603

Display	Action	Remark
	Select ORP calibration, proceed with **enter**	
	Remove the sensor and temperature probe, clean them, and immerse them in the redox buffer.	Display (3 sec) Now the device is in HOLD mode.
	Enter setpoint value for redox buffer. Press **enter** to proceed.	
	The ORP delta value is displayed (based on 25°C). Sensoface is active. Press **enter** to proceed.	
	To repeat calibration: Select REPEAT. To exit calibration: Select MEAS, then press **enter**	After end of calibration, the outputs remain in HOLD mode for a short time.

Temp Probe Adjustment

Display	Action	Remark
	Select temp adjustment. Press **enter** to proceed.	Wrong settings change the measurement properties!
	Measure the temperature of the process medium using an external thermometer.	Display (3 sec) Now the device is in HOLD mode.
	Enter the measured temperature value. Maximum difference: 10 K. Press **enter** to proceed.	Display of actual temperature (uncompensated) in the lower display.
	The corrected temperature value is displayed. Sensoface is active. To exit calibration: Select MEAS, then press **enter** To repeat calibration: Select REPEAT, then press **enter**	
	After calibration is ended, the device will switch to measuring mode.	After end of calibration, the outputs remain in HOLD mode for a short time.

Display	Remark
 or AM/PM and °F: 	From the configuration or calibration menus, you can switch the device to measuring mode by pressing the **meas** key. In the measuring mode the main display shows the configured process variable (pH, ORP [mV], or temperature), the secondary display shows the time and the second configured process variable (pH, ORP [mV], or temperature). The [meas] mode indicator lights and the active parameter set (A/B) is indicated.
By pressing the **meas** key you can step through the following displays. When no key has been pressed for 60 sec, the device returns to the standard display.	
   	1) Selecting the parameter set (if set to "manual" in the configuration). Select the desired parameter set using the ◂ ▸ arrow keys (PARSET A or PARSET B blinks in the lower display line). Confirm by pressing **enter**. Further displays (each with **meas**). 2) Display of tag number ("TAG") 3) Display of time and date

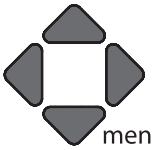
Diagnostics

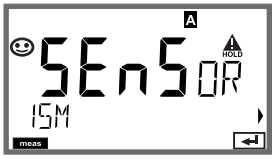
In the Diagnostics mode you can access the following menus without interrupting the measurement:

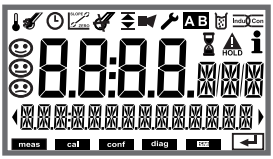
CALDATA	Viewing the calibration data
SENSOR	Viewing the sensor data
SELFTEST	Starting a device self-test
LOGBOOK	Viewing the logbook entries
MONITOR	Displaying currently measured values
VERSION	Displaying device type, software version, serial number

Access to diagnostics can be protected with a passcode (SERVICE menu).

Please note:
HOLD is not active during Diagnostics mode!

Action	Key	Remark
Activate Diagnostics	 menu	Press **menu** key to call the selection menu. (Display color changes to turquoise.) Select DIAG using ◂ ▸ keys, confirm by pressing **enter**.
Select diagnostics option		Use ◂ ▸ keys to select from: CALDATA SENSOR SELFTEST LOGBOOK MONITOR VERSION See next pages for further proceeding.
Exit	**meas**	Exit by pressing **meas**.

Display	Menu item
       	Display of calibration data Select CALDATA using ◂ ▸, confirm with **enter**. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display (LAST_CAL ISFET-ZERO ZERO SLOPE NEXT_CAL). The selected parameter is shown in the main display. Press **meas** to return to measurement.
  	**Display of sensor data** For analog sensors, the type is displayed (STANDARD / ISFET). Not applicable for digital transmitters (-MSPH). For digital sensors, the manufacturer, type, serial number, and last calibration date is displayed. In each case Sensoface is active. Display data using ◂ ▸ keys, return by pressing **enter** or **meas**.

Display	Menu item
	**Device self-test** (To abort, you can press **meas**.) 1) **Display test**: Display of all segments with changing background colors (white/green/red). Press **enter** to proceed.
	2) **RAM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Press **enter** to proceed.
	3) **EEPROM test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Press **enter** to proceed.
	4) **FLASH test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Press **enter** to proceed.
	5) **Module test:** Hourglass blinks, then display of --PASS-- or --FAIL-- Press **enter** or **meas** to return to measuring mode.

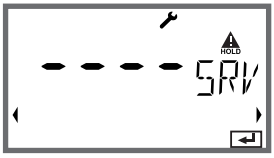
Display	Menu item
   	Displaying the logbook entries Select LOGBOOK using ◀ ▶, press **enter** to confirm. Using the ▲ ▼ keys, you can scroll backwards and forwards through the logbook (entries -00-...-99-), -00- being the last entry. If the display is set to date/time, you can search for a particular date using the ▲ ▼ keys. Press ◀ ▶ to view the corresponding message text. If the display is set to the message text, you can search for a particular message using the ▲ ▼ keys. Press ◀ ▶ to display the date and time. Press **meas** to return to measurement.
	Extended logbook / Audit Trail (via TAN) Using the ▲ ▼ keys, you can scroll backwards and forwards through the extended logbook (entries -000-...-199-), -000- being the last entry. **Display: CFR** Audit Trail also records function activations (CAL CONFIG SERVICE), some Sensoface messages (cal timer, wear) and opening of the enclosure.

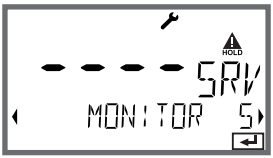
Display	Menu item
	Display of currently measured values (sensor monitor) Select MONITOR using ◂ ▸, press **enter** to confirm. Use the ◂ ▸ keys to select the desired parameter from the bottom line of the display: mV_PH mV_ORP RTD R_GLASS R_REF I-INPUT (for digital sensors also: OPERATION TIME SENSOR WEAR LIFETIME CIP SIP AUTOCLAVE, for ISM sensors in addition: ACT (adaptive calibration timer) TTM (adaptive maintenance timer) DLI (Dynamic Life Time Indicator). The selected parameter is shown in the main display. Press **meas** to return to measurement.
Display examples:	
	Display mV_pH (for validation, sensor can be immersed in a calibration solution, for example, or the device is checked by using a simulator)
	Display of remaining dynamic lifetime (only for digital sensors, however not for MEMOSENS)
	Display of sensor operating time (for digital sensors only)
	Version Display of **device type, software/hardware version**, and **serial number** for all device components. Use the ▴ ▾ keys to switch between software and hardware version. Press **enter** to proceed to next device component.

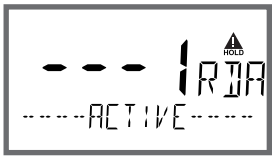
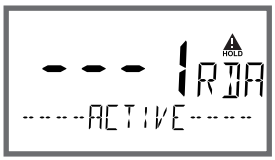
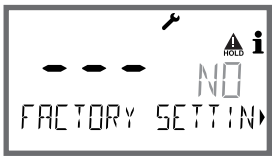
In the Service mode you can access the following menus:

MONITOR	Displaying currently measured values
SENSOR	ISM only: Resetting TTM Incrementing autoclaving counter
OUT1	Testing current output 1
OUT2	Testing current output 2
IRDA	Activating and communicating via the IrDA interface
CODES	Assigning and editing passcodes
DEFAULT	Resetting the device to factory settings
OPTION	Enabling options via TAN.

Please note:
HOLD is active during Service mode!

Action	Key/Display	Remark
Activate Service		Press **menu** key to call the selection menu. Select SERVICE using ◀ ▶ keys, press **enter** to confirm.
Passcode		Enter passcode "5555" for service mode using the ▲ ▼ ◀ ▶ keys. Press **enter** to confirm.
Display		In service mode the following icons are displayed: • [diag] mode indicator • HOLD triangle • Service (wrench)
Exit	**meas**	Exit by pressing **meas**.

Menu item	Remark
 Display example: 	**Displaying currently measured values (sensor monitor) with HOLD mode activated:** Select MONITOR using ◂ ▸, press **enter** to confirm. Select variable in the bottom text line using ◂ ▸. The selected parameter is shown in the main display. As the device is in HOLD mode, you can perform validations using simulators without influencing the signal outputs. Press **meas** to return to the service menu. Return to measurement: Press **meas** once more.
SENSOR / TTM 	**Resetting the adaptive maintenance timer** Here, the interval is reset to its initial value. To do so, select **"TTM RESET = YES"** and confirm by pressing **enter**.
SENSOR / AUTOCLAVE 	**Incrementing the autoclaving counter** After having completed an autoclaving process, you must increment the autoclaving count. To do so, select "**YES**" and confirm by pressing **enter**. The device confirms with "INCREMENT AUTOCLAVE CYCLE".
	Specifying current at outputs 1 and 2: Select OUT1 or OUT2 using the ◂ ▸ keys, press **enter** to confirm. Enter a valid current value for the respective output using ▲ ▼ ◂ ▸ keys. Press **enter** to confirm. For checking purposes, the actual output current is shown in the bottom right corner of the display. End by pressing **enter** or **meas**.

Menu item	Remark
	**IrDA communication:** Select IRDA using ◀ ▶, press **enter** to confirm.
HOLD 	When IrDA communication is active, the device remains in the HOLD mode for reasons of safety. Further operation is performed via IrDA. End communication by pressing **meas**. **Exception: Firmware update (must not be interrupted!)**
	Assigning passcodes: In the "SERVICE - CODES" menu you can assign passcodes to DIAG, HOLD, CAL, CONF and SERVICE modes (Service preset to 5555). **When you have lost the Service passcode**, you have to request an "Ambulance TAN" from the manufacturer specifying the serial number of your device. To enter the "Ambulance TAN", call the Service function and enter passcode 7321. After correct input of the ambulance TAN the device signals "PASS" for 4 sec and resets the Service passcode to 5555.
	**Reset to factory settings:** In the "SERVICE - DEFAULT" menu you can reset the device to factory settings. **Caution!** After a reset to factory setting the device must be reconfigured completely, including the sensor parameters!
	Releasing an option: Options come with a "transaction number" (TAN). To release the option, enter this TAN and confirm by pressing **enter**.

Operating States

Operating status	OUT 1	OUT 2	Time out
Measuring			-
DIAG			60 s
CAL			No
CONF			20 min
SERVICE			20 min
SERVICE OUT 1			20 min
SERVICE OUT 2			20 min
HOLD			No

Explanation:

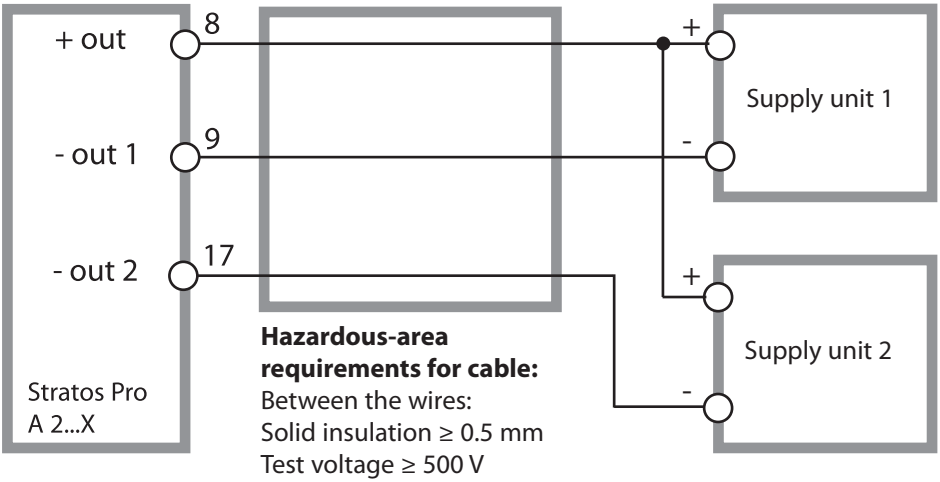
as configured (Last/Fix or Last/Off)

active

manual

Recommended Power Supply Units:	Order No.:
Repeater power supply, Ex, 24 V AC/DC, output 0/4...20 mA	WG 20 A2
Repeater power supply, Ex, 90...253 V AC, output 4...20 mA	WG 21 A7
Repeater power supply, Ex, 90...253 V AC, HART, output 4...20 mA	WG 21 A7 Opt. 470
Repeater power supply, Ex, 24 V AC/DC, output 4...20 mA	WG 21 A7 Opt. 336
Repeater power supply, Ex, 24 V AC/DC, HART, output 4...20 mA	WG 21 A7 Opt. 336, 470
Repeater power supply, non-Ex, 24 V DC, output 4...20 mA	IsoAmp PWR B 10116
Repeater power supply, non-Ex, 24 V DC, HART, output 0/4...20 mA / 0...10 V	IsoAmp PWR A 20100

Connection to Supply Units



Product Line and Accessories

Order Code Stratos Pro A 2...

									TAN
Example	A	2	0	1	X	-	PH	-	1	
2-wire / 4-20 mA	A	2								B,C,E
Communication										
Without (HART retrofittable via TAN)			0							A
Version number										
Version				1						
Approvals										
General Safety					N					
ATEX / IECEx Zone 2					B					
ATEX / IECEx / FM / CSA Zone 1 / Cl 1 Div 1					X					
Other approvals					Z					
Measuring channel										
Memosens pH / Redox	digital						MSPH			
Memosens Cond	digital						MSCOND			
Memosens Oxy	digital						MSOXY			
Dual COND (2x2-electrode sensors, analog)					N		CC			
pH / ORP value (ISM digital per TAN)	Measuring module						PH			F
Cond, 2-/4-electrode	Measuring module						COND			
Conductivity, electrodeless	Measuring module						CONDI			
Oxygen (ISM digital and traces per TAN)	Measuring module						OXY			D, F
Options										
Without 2nd current output									0	
With 2nd current output									1	

TAN options		
HART	SW-A001	(A)
Logbook	SW-A002	(B)
Extended logbook (Audit Trail)	SW-A003	(C)
Trace oxygen measurement	SW-A004	(D)
Current input + 2 digital inputs	SW-A005	(E)
ISM digital	SW-A006	(F)

Mounting accessories	
Pipe-mount kit	ZU 0274
Protective hood	ZU 0737
Panel-mount kit	ZU 0738

pH/mV input	Input for pH or ORP sensors or ISFET		
	Input	Glass electrode or ISFET	
	Input	Reference electrode	
	Input	ORP electrode (e.g. platinum) or auxiliary electrode for impedance measurement	
Measuring range	–1500 ... +1500 mV		
Display range	pH value	–2.00 ... 16.00	
	ORP	–1999 ... +1999 mV	
Glass electrode input[5]	Input resistance	> 1 x 10^{12} Ω	
	Input current	< 1 x 10^{-12} A	
	Impedance range	0.5 ... 1000 MΩ (± 20%)	
Reference electrode input[5]	Input resistance	> 1 x 10^{10} Ω	
	Input current	< 1 x 10^{-10} A	
	Impedance range [2]	0.5 ... 200 kΩ (± 20%)	
Measurement error [1,2,3]	pH value	< 0.02	TC: 0.002 pH/K
	mV value	< 1 mV	TC: 0.1 mV/K
pH sensor standardization *	pH calibration		
Operating modes	BUF	Calibration with Calimatic automatic buffer recognition	
	MAN	Manual calibration with entry of individual buffer values	
	DAT	Data entry of pre-measured electrodes	
	Product calibration		
Calimatic buffer sets *	-01- Mettler-Toledo	2.00/4.01/7.00/9.21	
	-02- Knick CaliMat	2.00/4.00/7.00/9.00/12.00	
	-03- Ciba (94)	2.06/4.00/7.00/10.00	
	-04- NIST technical	1.68/4.00/7.00/10.01/12.46	
	-05- NIST standard	1.679/4.006/6.865/9.180	
	-06- HACH	4.01/7.00/10.01	
	-07- WTW techn. buffers	2.00/4.01/7.00/10.00	
	-08- Hamilton	4.01/7.00/10.01/12.00	
	-09- Reagecon	2.00/4.00/7.00/9.00/12.00	
	-10- DIN 19267	1.09/4.65/6.79/9.23/12.75	
	-U1-	Specifiable buffer set with 2 buffer solutions	

Specifications

Zero adjustment	± 200 mV (for ISFET)	
Max. calibration range	Asymmetry potential	±60 mV
	Slope	80 ... 103 % (47.5 ... 61 mV/pH)
	(possibly restricting notes from Sensoface)	
ORP sensor standardization*	ORP calibration (zero adjustment)	
Max. calibration range	–700 ... +700 ΔmV	
Adaptive cal timer* (Pat. DE 101 41 408)	Interval 0000 ... 9999 h	
Sensocheck	Automatic monitoring of glass and reference electrode (can be disabled)	
Delay	Approx. 30 s	
Sensoface	Provides information on the sensor condition, evaluation of zero/slope, response time, calibration interval, wear, Sensocheck, can be switched off	
Temperature input	Pt100 / Pt1000 / NTC 30 kΩ *	
	2-wire connection, adjustable	
Measuring range	Pt 100/Pt 1000	-20.0 ... +200.0 °C / –4 ... +392 °F
	NTC 30 kΩ	-20.0 ... +150.0 °C / –4 ... +302 °F
	NTC 8.55 kΩ (Mitsubishi)	–10.0 ... +130.0 °C / +14 ... +266 °F
	Balco 3 kΩ	–20.0 ... +130.0 °C / –4 ... +266 °F
Adjustment range	10 K	
Resolution	0.1 °C / 0.1 °F	
Measurement error [1,2,3)]	< 0.5 K (< 1K for Pt100; < 1K for NTC >100°C)	
Temperature compensation of process medium	Linear -19.99 ... +19.99 %/K (reference temp 25 °C) ultrapure water, user-defined table	
ISM input	"One wire" interface for operation with ISM (digital sensors)	
	(6 V / Ri= approx. 1.2 kΩ)	
Power output	for operating an ISFET adapter	
	+3 V / 0.5 mA	
	–3 V / 0.5 mA	

I input (TAN)	Current input 0/4 ... 20 mA / 50 Ω for external temperature signal		
Start/end of scale	Configurable –20 ... 200 °C (-4 ... +392 °F)		
Characteristic	Linear		
Measurement error [1.3)]	< 1% current value + 0.1 mA		
HOLD input	Galvanically separated (OPTO coupler)		
Function	Switches device to HOLD mode		
Switching voltage	0 ... 2 V (AC/DC)	HOLD inactive	
	10 ... 30 V (AC/DC)	HOLD active	
CONTROL input	Galvanically separated (OPTO coupler)		
Function	Selecting parameter set A/B or flow measurement		
Parameter set A/B	Control input	0 ... 2 V (AC/DC) 10 ... 30 V (AC/DC)	Parameter set A Parameter set B
FLOW	Pulse input for flow measurement 0 ... 100 pulses/s Pulse amplitude 10 ... 30 V DC		
Message	via 22 mA		
Display	00.0 … 99.9 l/h		
Output 1	Current loop, 4 ... 20 mA, floating, protected against inverse polarity HART communication (see further below for specifications)		
Supply voltage	14 ... 30 V		
Process variable *	pH, ORP or temperature		
Characteristic	Linear		
Overrange *	22 mA in the case of error messages		
Output filter *	PT_1 filter, time constant 0 ... 120 s		
Measurement error [1)]	< 0.25 % current value + 0.025 mA		
Start/end of scale *	Configurable within selected range		
Minimum span	pH 2.00 / 200 mV / 20 K / 36 °F		

Output 2	Current loop, 4 ... 20 mA, floating, protected against inverse polarity
Supply voltage	14 ... 30 V
Process variable *	pH, ORP or temperature
Overrange *	22 mA in the case of error messages
Output filter *	PT_1 filter, time constant 0 ... 120 s
Measurement error [1)]	< 0.25 % of current value + 0.05 mA
Start/end of scale *	Configurable within selected range
Minimum span	pH 2.00 / 200 mV / 20 K / 36 °F
Real-time clock	Different time and date formats selectable
Power reserve	> 5 days
Display	LC display, 7-segment with icons
Main display	Character height approx. 22 mm, unit symbols approx. 14 mm
Secondary display	Character height approx. 10 mm
Text line	14 characters, 14 segments
Sensoface	3 status indicators (friendly, neutral, sad face)
Mode Indicators	meas, cal, conf, diag Further icons for configuration and messages
Alarm indication	Display blinks, red backlighting
Keypad	Keys: meas, menu, info, 4 cursor keys, enter
HART communication	HART version 6 Digital communication by FSK modulation of output current 1 Device identification, measured values, status and messages, parameter setting, calibration, records
IrDA interface	Infrared interface for firmware update
FDA 21 CFR Part 11	Access control by editable passcodes Logbook entry and flag via HART Message and logbook entry when enclosure is opened

Diagnostics functions	
Calibration data	Calibration date, zero, slope, response time
Device self-test	Display test, automatic memory test (RAM, FLASH, EEPROM), module test
Logbook	100 events with date and time
Extended logbook (TAN)	Audit Trail: 200 events with date and time
Service functions	
Sensor monitor	Display of direct sensor signals
Current source	Current specifiable for output 1 and 2 (04.00 ... 22.00 mA)
IrDA	Activating the IrDA function
Passcodes	Assigning passcodes for menu access
Factory setting	Resetting all parameters to factory setting
TAN	Enabling optionally available additional functions
Data retention	Parameters, calibration data, logbook > 10 years (EEPROM)
EMC	EN 61326-1 (General Requirements)
Emitted interference	Class B (residential area)
Immunity to interference	Industry EN 61326-2-3
Nominal operating conditions	
Ambient temperature	–20 ... +65 °C
Transport/Storage temperature	–30 ... +70 °C
Relative humidity	10 ... 95% not condensing
Supply voltage	14 ... 30 V

Explosion protection
Stratos Pro A2...X

IECEx		Ex ib[ia] IIC T4 / zone 0 Ex ia IIC T4 / Ex iaD 20 IP 6X T 85 °C
ATEX		II 2(1) G Ex ib[ia] IIC T4 / II 1 G Ex ia IIC T4 II 1 D Ex iaD 20 IP6x T85°C / II 2 D Ex iaD 21 IP6x T85°C
FM	C/US	NI/I/2/ABCD/T4 / S/II,III/2/FG/T4, Type 4X
	C	IS/I,II,III/1/ABCDEFG/T4 / I/0/Ex ia IIC T4, Entity, Type 4X I/2/Ex nA IIC T4 / 22/Ex tD T85°C; Type 4X
	US	IS/I,II,III/1/ABCDEFG/T4 / I/0/AEx ia IIC T4, Entity, Type 4X I/2/AEx nA IIC T4 / 22/AEx tD T85°C, Type 4X
CSA		IS, Class I,II,III Div 1, GP A,B,C,D,E,F,G T4, Entity, Type 4X
		AIS Class I,II,III Div 1, GP A,B,C,D,E,F,G T4, Entity, Type 4X
		Class I, Zone 1, AEx ia IIC T4, Entity, Type 4X
NEPSI		Ex ib[ia] IIC T4 / Ex ia IIC T4 / DIP A20 TA,T6
GOST		1Exib[ia]IICT4 / 0ExiaIICT4 / DIP A20 TA 85°C / DIP A21 TA 85°C

Explosion protection
Stratos Pro A2...B

IECEx		Ex nA II T4 / Ex nL IIC T4 / Ex tD A22 IP5X T85 °C
ATEX Zone 2		II 3 G Ex nA II T4 / II 3 G Ex nL IIC T4 / II 3 D Ex tD A22 IP5X T85 °C
FM	C	NI / I / 2 / ABCD / T4 Ta= 65 °C; Type 4X DIP / II,III / 2 / T4, Ta=65 °C; Type 4X I / 2 / Ex nA / IIC /T4, Ta= 65 °C; Type 4X 22 / Ex tD/ T85 °C; Type 4X
	US	NI / I / 2 / ABCD / T4 Ta= 65 °C; Type 4X S / II,III / 2 / FG / T4 Ta = 65 °C; Type 4X I / 2 / Ex nA / IIC/ T4, Ta = 65°C; Type 4X 22 / Ex tD/ T85 °C; Type 4X
CSA		Class I,II,III Div 2, GP A,B,C,D,E,F,G T4, Ta=65 °C, Type 4X Ex nA II T4, Ta= 65°C, Type 4X DIP A22, Class II and III, Division 2, Groups E, F and G, Type 4x
NEPSI		Ex nA IIC T4 / Ex nL IIC T4 / DIP A22 TA,T6
GOST		2 Ex nA II T4 / DIP A22 TA 85°C

Memosens Ex wiring	**U_o (V)**	**I_o (mA)**	**P_o (mW)**	**C_i (µH)**	**L_i (µH)**
Stratos Pro A2...X / A2...B	5	124	155	10.6	0

Enclosure	Molded enclosure made of glass-reinforced PBT, PC
Mounting	Wall, pipe/post or panel mounting
Color	Gray, RAL 7001
Ingress protection	IP 67, NEMA 4X
Flammability	UL 94 V-0
Dimensions	148 mm x 148 mm
Control panel cutout	138 mm x 138 mm to DIN 43 700
Weight	Approx. 1200 g
Cable glands	3 knockouts for M20 x 1.5 cable glands 2 knockouts for NPT ½" or rigid metallic conduit
Connections	Terminals, conductor cross-section max. 2.5 mm^2

*) User-defined

1) Acc. to EN 60746, at nominal operating conditions

2) ± 1 count

3) Plus sensor error

5) At room temperature

-01- Mettler-Toledo
(corresponds to former "Knick technical buffers")

°C	pH			
0	2.03	4.01	7.12	9.52
5	2.02	4.01	7.09	9.45
10	2.01	4.00	7.06	9.38
15	2.00	4.00	7.04	9.32
20	2.00	4.00	7.02	9.26
25	**2.00**	**4.01**	**7.00**	**9.21**
30	1.99	4.01	6.99	9.16
35	1.99	4.02	6.98	9.11
40	1.98	4.03	6.97	9.06
45	1.98	4.04	6.97	9.03
50	1.98	4.06	6.97	8.99
55	1.98	4.08	6.98	8.96
60	1.98	4.10	6.98	8.93
65	1.99	4.13	6.99	8.90
70	1.99	4.16	7.00	8.88
75	2.00	4.19	7.02	8.85
80	2.00	4.22	7.04	8.83
85	2.00	4.26	7.06	8.81
90	2.00	4.30	7.09	8.79
95	2.00	4.35	7.12	8.77

-02- Knick CaliMat
(Merck Titrisols, Riedel-de-Haen Fixanals)

°C	**pH**				
Order No.	CS-P0200A/...	CS-P0400A/...	CS-P0700A/...	CS-P0900A/...	CS-P1200A/...
0	2.01	4.05	7.09	9.24	12.58
5	2.01	4.04	7.07	9.16	12.39
10	2.01	4.02	7.04	9.11	12.26
15	2.00	4.01	7.02	9.05	12.13
20	**2.00**	**4.00**	**7.00**	**9.00**	**12.00**
25	2.00	4.01	6.99	8.95	11.87
30	2.00	4.01	6.98	8.91	11.75
35	2.00	4.01	6.96	8.88	11.64
40	2.00	4.01	6.96	8.85	11.53
50	2.00	4.01	6.96	8.79	11.31
60	2.00	4.00	6.96	8,73	11.09
70	2.00	4.00	6.96	8,70	10.88
80	2.00	4.00	6.98	8,66	10.68
90	2.00	4.00	7.00	8,64	10.48

-03- Ciba (94) buffers
Nominal values: 2.06 4.00 7.00 10.00

°C	pH			
0	2.04	4.00	7.10	10.30
5	2.09	4.02	7.08	10.21
10	2.07	4.00	7.05	10.14
15	2.08	4.00	7.02	10.06
20	2.09	4.01	6.98	9.99
25	2.08	4.02	6.98	9.95
30	2.06	4.00	6.96	9.89
35	2.06	4.01	6.95	9.85
40	2.07	4.02	6.94	9.81
45	2.06	4.03	6.93	9.77
50	2.06	4.04	6.93	9.73
55	2.05	4.05	6.91	9.68
60	2.08	4.10	6.93	9.66
65	2.07*	4.10*	6.92*	9.61*
70	2.07	4.11	6.92	9.57
75	2.04*	4.13*	6.92*	9.54*
80	2.02	4.15	6.93	9.52
85	2.03*	4.17*	6.95*	9.47*
90	2.04	4.20	6.97	9.43
95	2.05*	4.22*	6.99*	9.38*

* extrapolated

-04- NIST technical buffers

°C	pH				
0	1.67	4.00	7.115	10.32	13.42
5	1.67	4.00	7.085	10.25	13.21
10	1.67	4.00	7.06	10.18	13.01
15	1.67	4.00	7.04	10.12	12.80
20	1.675	4.00	7.015	10.06	12.64
25	**1.68**	**4.005**	**7.00**	**10.01**	**12.46**
30	1.68	4.015	6.985	9.97	12.30
35	1.69	4.025	6.98	9.93	12.13
40	1.69	4.03	6.975	9.89	11.99
45	1.70	4.045	6.975	9.86	11.84
50	1.705	4.06	6.97	9.83	11.71
55	1.715	4.075	6.97	9.83*	11.57
60	1.72	4.085	6.97	9.83*	11.45
65	1.73	4.10	6.98	9.83*	11.45*
70	1.74	4.13	6.99	9.83*	11.45*
75	1.75	4.14	7.01	9.83*	11.45*
80	1.765	4.16	7.03	9.83*	11.45*
85	1.78	4.18	7.05	9.83*	11.45*
90	1.79	4.21	7.08	9.83*	11.45*
95	1.805	4.23	7.11	9.83*	11.45*

* Values complemented

-05- NIST standard buffers
NIST Standard (DIN 19266 : 2000-01)

°C	pH				
0					13.423
5	1.668	4.004	6.950	9.392	13.207
10	1.670	4.001	6.922	9.331	13.003
15	1.672	4.001	6.900	9.277	12.810
20	1.676	4.003	6.880	9.228	12.627
25	**1.680**	**4.008**	**6.865**	**9.184**	**12.454**
30	1.685	4.015	6.853	9.144	12.289
37	1.694	4.028	6.841	9.095	12.133
40	1.697	4.036	6.837	9.076	11.984
45	1.704	4.049	6.834	9.046	11.841
50	1.712	4.064	6.833	9.018	11.705
55	1.715	4.075	6.834	8.985	11.574
60	1.723	4.091	6.836	8.962	11.449
65					11.330
70	1.743	4.126	6.845	8.921	11.210
75					11.100
80	1.766	4.164	6.859	8.885	10.990
85					10.890
90	1.792	4.205	6.877	8.850	10.790
95	1.806	4.227	6.886	8.833	10.690

Please note:
The actual pH values of the individual batches of the reference materials are documented in a certificate of an accredited laboratory. This certificate is supplied with the respective buffers. Only these pH(S) values shall be used as standard values for the secondary reference buffer materials. Correspondingly, this standard does not include a table with standard pH values for practical use. The table above only provides examples of pH(PS) values for orientation.

-06- HACH buffers
Nominal values: 4.01 7.00 10.01 (± 0.02 at 25 °C)

°C	pH		
0	4.00	7.118	10.30
5	4.00	7.087	10.23
10	4.00	7.059	10.17
15	4.00	7.036	10.11
20	4.00	7.016	10.05
25	4.01	7.000	10.01
30	4.01	6.987	9.96
35	4.02	6.977	9.92
40	4.03	6.970	9.88
45	4.05	6.965	9.85
50	4.06	6.964	9.82
55	4.07	6.965	9.79
60	4.09	6.968	9.76
65	4.10*	6.98*	9.71*
70	4.12*	7.00*	9.66*
75	4.14*	7.02*	9.63*
80	4.16*	7.04*	9.59*
85	4.18*	7.06*	9.56*
90	4.21*	7.09*	9.52*
95	4.24*	7.12*	9.48*

* Values complemented

-07- WTW technical buffers

°C	pH			
0	2.03	4.01	7.12	10.65
5	2.02	4.01	7.09	10.52
10	2.01	4.00	7.06	10.39
15	2.00	4.00	7.04	10.26
20	2.00	4.00	7.02	10.13
25	**2.00**	**4.01**	**7.00**	**10.00**
30	1.99	4.01	6.99	9.87
35	1.99	4.02	6.98	9.74
40	1.98	4.03	6.97	9.61
45	1.98	4.04	6.97	9.48
50	1.98	4.06	6.97	9.35
55	1.98	4.08	6.98	
60	1.98	4.10	6.98	
65	1.99	4.13	6.99	
70	2.00	4.16	7.00	
75	2.00	4.19	7.02	
80	2.00	4.22	7.04	
85	2.00	4.26	7.06	
90	2.00	4.30	7.09	
95	2.00	4.35	7.12	

-08- Hamilton Duracal buffers

°C	pH				
0	1.99	4.01	7.12	10.23	12.58
5	1.99	4.01	7.09	10.19	12.46
10	2.00	4.00	7.06	10.15	12.34
15	2.00	4.00	7.04	10.11	12.23
20	2.00	4.00	7.02	10.06	12.11
25	**2.00**	**4.01**	**7.00**	**10.01**	**12.00**
30	1.99	4.01	6.99	9.97	11.90
35	1.98	4.02	6.98	9.92	11.80
40	1.98	4.03	6.97	9.86	11.70
45	1.97	4.04	6.97	9.83	11.60
50	1.97	4.05	6.97	9.79	11.51
55	1.98	4.06	6.98	9.75	11.42
60	1.98	4.08	6.98	9.72	11.33
65	1.98	4.10*	6.99*	9.69*	11.24
70	1.99	4.12*	7.00*	9.66*	11.15
75	1.99	4.14*	7.02*	9.63*	11.06
80	2.00	4.16*	7.04*	9.59*	10.98
85	2.00	4.18*	7.06*	9.56*	10.90
90	2.00	4.21*	7.09*	9.52*	10.82
95	2.00	4.24*	7.12*	9.48*	10.74

* Values complemented

-09- Reagecon buffers

°C	pH				
0°C	*2.01	*4.01	*7.07	*9.18	*12.54
5°C	*2.01	*4.01	*7.07	*9.18	*12.54
10°C	2.01	4.00	7.07	9.18	12.54
15°C	2.01	4.00	7.04	9.12	12.36
20°C	2.01	4.00	7.02	9.06	12.17
25°C	**2.00**	**4.00**	**7.00**	**9.00**	**12.00**
30°C	1.99	4.01	6.99	8.95	11.81
35°C	2.00	4.02	6.98	8.90	11.63
40°C	2.01	4.03	6.97	8.86	11.47
45°C	2.01	4.04	6.97	8.83	11.39
50°C	2.00	4.05	6.96	8.79	11.30
55°C	2.00	4.07	6.96	8.77	11.13
60°C	2.00	4.08	6.96	8.74	10.95
65°C	*2.00	*4.10	*6.99	*8.70	*10.95
70°C	*2.00	*4.12	*7.00	*8.67	*10.95
75°C	*2.00	*4.14	*7.02	*8.64	*10.95
80°C	*2.00	*4.16	*7.04	*8.62	*10.95
85°C	*2.00	*4.18	*7.06	*8.60	*10.95
90°C	*2.00	*4.21	*7.09	*8.58	*10.95
95°C	*2.00	*4.24	*7.12	*8.56	*10.95

* Values complemented

-10- DIN 19267 buffers

°C	pH				
0	1,08	4,67	6,89	9,48	13,95*
5	1,08	4,67	6,87	9,43	13,63*
10	1,09	4,66	6,84	9,37	13,37
15	1,09	4,66	6,82	9,32	13,16
20	1,09	4,65	6,80	9,27	12,96
25	**1,09**	**4,65**	**6,79**	**9,23**	**12,75**
30	1,10	4,65	6,78	9,18	12,61
35	1,10	4,65	6,77	9,13	12,45
40	1,10	4,66	6,76	9,09	12,29
45	1,10	4,67	6,76	9,04	12,09
50	1,11	4,68	6,76	9,00	11,89
55	1,11	4,69	6,76	8,96	11,79
60	1,11	4,70	6,76	8,92	11,69
65	1,11	4,71	6,76	8,90	11,56
70	1,11	4,72	6,76	8,88	11,43
75	1,11	4,73	6,77	8,86	11,31
80	1,12	4,75	6,78	8,85	11,19
85	1,12	4,77	6,79	8,83	11,09
90	1,13	4,79	6,80	8,82	10,99
95	1,13*	4,82*	6,81*	8,81*	10,89*

* extrapoliert / extrapolated / extrapolée

You can specify a buffer set with 2 buffer solutions in the temperature range of 0 ... 95 °C, step width: 5 °C.
To do so, select buffer set -U1- in the configuration menu.
As delivered, the Ingold technical buffer solutions pH 4.01 / 7.00 are stored as buffer set and can be edited.

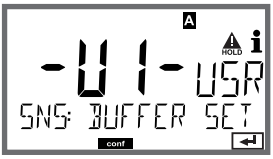
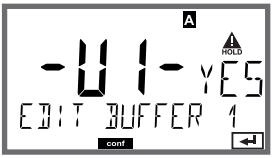
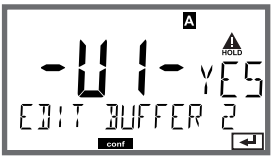
Conditions for the specifiable buffer set:

- All values must lie in the range pH 0 ... 14
- Maximum difference between two adjacent pH values (5 °C step width) of the same buffer solution: pH 0.25
- The values of buffer solution 1 must be lower than those of buffer solution 2:
  The difference between values for identical temperatures must be greater than 2 pH units.

Faulty entries are indicated in measuring mode by the "FAIL BUFFERSET -U1-" message.

The 25 °C value is always used for buffer display during calibration.

-U1- Specifiable Buffer Set

Step	Action/Display	Remark
Select buffer set -U1- (CONFIG / SNS menu)		
Select buffer solution 1 for editing	 Select "YES" using up/ down key.	You are prompted for confirmation to prevent accidental changes of the settings.
Editing the values of buffer solution 1	 Edit using arrow keys, press **enter** to confirm and proceed to next temperature value. 	Enter the values for the first buffer solution in 5°C steps. The difference to the next value must not exceed 0.25 pH unit.
Select buffer solution 2 for editing		The difference between buffer solutions for identical temperatures must be greater than 2 pH units.

Buffer Set U1:
Fill in your configuration data or use the table as original for copy.

Temperature (°C)	Buffer 1	Buffer 2
5		
10		
15		
20		
25		
30		
35		
40		
45		
50		
55		
60		
65		
70		
75		
80		
85		
90		
95		

Error Handling

Alarm condition:

- The display backlighting turns **red**
- The alarm icon is displayed
- The complete measured-value display blinks
- "**ERR xxx**" is displayed in the lower menu line

Press the [**info**] key to view a short error text:

- The error text appears in the lower menu line
- The main display reads "**InFo**".

Parameter errors:

Configuration data such as current range, limit values, etc are checked during the input.
If they are out of range,

- "**ERR xxx**" is displayed for 3 sec,
- the display backlighting flashes red,
- the respective maximum or minimum value is shown,
- input must be repeated.

If a faulty parameter arrives through the interface (IrDA, HART),

- an error message will be displayed: "**ERR 100...199**"
- the faulty parameter can be localized by pressing the [**info**] key

Calibration errors:

If errors occur during calibration,

- an error message will be displayed

Sensoface:

If the Sensoface becomes sad,

- the display backlighting will turn purple
- the cause can be seen by pressing the **info** key
- the calibration data can be seen in the Diagnostics menu

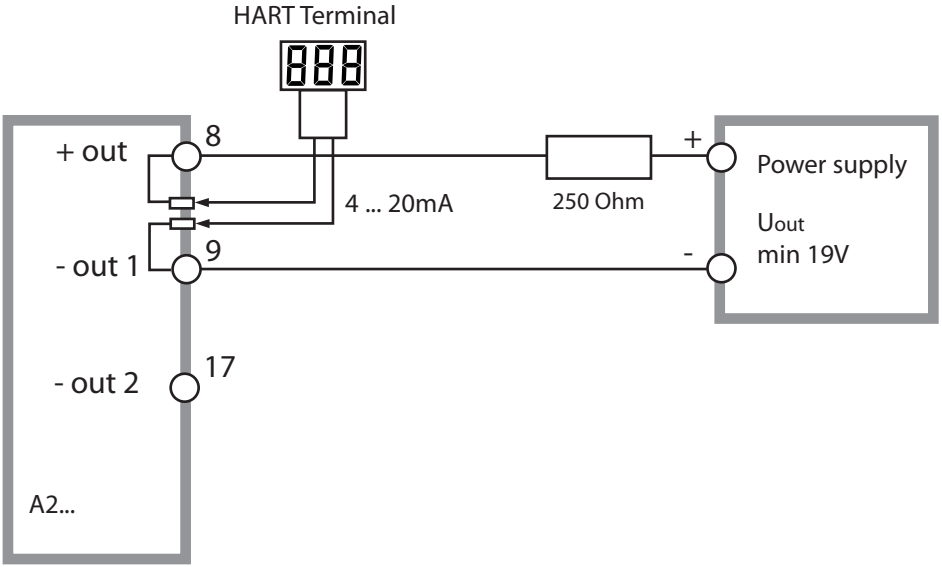
Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 99	DEVICE FAILURE	**Error in factory settings** EEPROM or RAM defective This error message only occurs in the case of a total defect. The device must be repaired and recalibrated at the factory.
ERR 98	CONFIGURATION ERROR	**Error in configuration or calibration data** Memory error in device program Configuration or calibration data defective; completely reconfigure and recalibrate the device.
ERR 97	NO MODULE INSTALLED	**No module** Please have the module installed in the factory.
ERR 96	WRONG MODULE	**Wrong module** Please have the module replaced in the factory.
ERR 95	SYSTEM ERROR	**System error** Restart required. If error still persists, send in the device for repair.
ERR 01	NO SENSOR	**pH sensor *** Sensor defective Sensor not connected Break in sensor cable
ERR 02	WRONG SENSOR	**Wrong sensor ***
ERR 03	CANCELED SENSOR	**Sensor devaluated ***

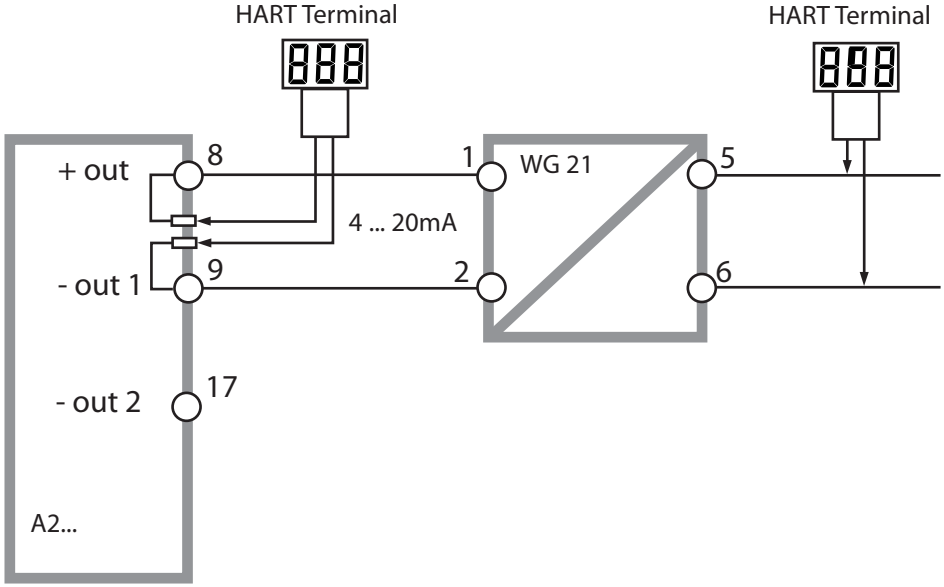
Error	Info text (is displayed in case of fault when the Info key is pressed)	Problem Possible causes
ERR 04	SENSOR FAILURE	**Failure in sensor ***
ERR 05	CAL DATA	**Error in cal data ***
ERR 10	ORP RANGE	**ORP display range violation** < -1999 mV or > 1999 mV
ERR 11	PH RANGE	**pH display range violation** < -2 or > 16
ERR 12	MV RANGE	**mV range**
ERR 13	TEMPERATURE RANGE	**Temperature range violation**
ERR 15	SENSOCHECK GLASS-EL	**Sensocheck glass**
ERR 16	SENSOCHECK REF-EL	**Sensocheck ref.**
ERR 60	OUTPUT LOAD	**Load error**
ERR 61	OUTPUT 1 TOO LOW	**Output current 1** < 3.8 mA
ERR 62	OUTPUT 1 TOO HIGH	**Output current 1** > 20.5 mA
ERR 63	OUTPUT 2 TOO LOW	**Output current 2** < 3.8 mA
ERR 64	OUTPUT 2 TOO HIGH	**Output current 2** > 20.5 mA
ERR 69	TEMP. OUTSIDE TABLE	**Temperature** value outside table

*) Digital sensors (ISM, InduCon, Memosens)

Error	**Info text** (is displayed in case of fault when the Info key is pressed)	**Problem** **Possible causes**
ERR 72	FLOW TOO LOW	Flow too low
ERR 73	FLOW TOO HIGH	Flow too high
ERR 100	INVALID SPAN OUT1	Span Out1 configuration error Selected span too small
ERR 101	INVALID SPAN OUT2	Span Out2 configuration error Selected span too small
ERR 102	FAILURE BUFFERSET -U1-	Configuration error: Specifiable buffer set U1
ERR 105	INVALID SPAN I-INPUT	I-Input configuration error

HART: Typical Applications





(Sensocheck must have been activated during configuration.)

The smiley in the display (Sensoface) alerts to sensor problems (defective sensor, sensor wear, defective cable, maintenance request). The permitted calibration ranges and the conditions for a friendly, neutral, or sad Sensoface are summarized in the following table. Additional icons refer to the error cause.

Sensocheck
Continuously monitors the sensor and its wiring.
Critical values make the Sensoface "sad" and the corresponding icon blinks:

The Sensocheck message is also output as error message Err 15 (glass electrode) or Err 16 (reference electrode – for digital transmitters, however only with InduCon sensors with SG). The alarm contact is active, the display backlighting turns red, output current 1 is set to 22 mA (when configured correspondingly).
Sensocheck can be switched off during configuration (then Sensoface is also disabled).
Exception:
After a calibration a smiley is always displayed for confirmation.

Please note:
The worsening of a Sensoface criterion leads to the devaluation of the Sensoface indicator (Smiley becomes "sad"). An improvement of the Sensoface indicator can only take place after calibration or removal of the sensor defect.

Display	Problem	Status	
	Asymmetry potential and slope	😐	Asymmetry potential (zero) and slope of the sensor are still okay. The sensor should be replaced soon.
		☹	Asymmetry potential and slope of the sensor have reached values which no longer ensure proper calibration. Replace sensor.
	Calibration timer	😐	Over 80% of the calibration interval has already past.
		☹	The calibration interval has been exceeded.
	Sensor defect	☹	Check the sensor and its connections (see also Error Messages Err 15 and Err 16).
	Response time	😐	Sensor response time has increased. The sensor should be replaced soon. To achieve an improvement, clean the sensor and soak it in buffer.
		☹	Sensor response time significantly increased (> 72 s, calibration aborted after 120 s) Replace sensor.

Display	Problem	Status
	Sensor wear (for digital sensors only)	High temperatures and pH values have caused a wear of over 80%. The sensor should be replaced soon. Wear is at 100%. Replace sensor.
SENSOR WEAR CHANGE SENSOR (DLI)		Replace sensor
AUTOCLAVE CYCLES OVERRUN		Maximally permitted number of auto-claving cycles has been reached. Replace sensor or increment autoclaving counter.
SIP CYCLES OVERRUN		Maximally permitted number of sterilizing cycles has been reached. Replace sensor or increment SIP counter.
CIP CYCLES OVERRUN		Maximally permitted number of cleaning cycles has been reached. Replace sensor or increment CIP counter.

Conformity with FDA 21 CFR Part 11

In their directive "Title 21 Code of Federal Regulations, 21 CFR Part 11, Electronic Records; Electronic Signatures" the US American health agency FDA (Food and Drug Administration) regulates the production and processing of electronic documents for pharmaceutical development and production. This results in requirements for measuring devices used for corresponding applications. The following features ensure that the measuring devices of this Series meet the demands of FDA 21 CFR Part 11:

Electronic Signature – Passcodes

Access to the device functions is regulated and limited by individually adjustable codes – "Passcodes" (see SERVICE). This prevents unauthorized modification of device settings or manipulation of the measurement results. Appropriate use of these passcodes makes them suitable as electronic signature.

Audit Trail

Every (manual) change of device settings can be automatically documented. Each change is tagged with a "Configuration Change Flag", which can be interrogated and documented using HART communication. Altered device settings or parameters can also be retrieved and documented using HART communication.

Extended logbook

Audit Trail also records function activations (CAL, CONFIG, SERVICE), some Sensoface messages (cal timer, wear), and opening of the enclosure.

Adaptive cal timer (ACT)	By issuing a Sensoface message, the adaptive calibration timer reminds you to calibrate the sensor. The ACT interval is either read automatically from the sensor settings or can be specified manually. Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.
Adaptive maintenance timer (TTM)	By issuing a Sensoface message, the adaptive maintenance timer reminds you to service the sensor. The TTM interval is either read automatically from the sensor settings or can be specified manually. Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.
Asymmetry potential	The voltage which a pH sensor provides at a pH of 7. The asymmetry potential is different for each sensor and changes with age and wear.
Buffer set	Contains selected buffer solutions which can be used for automatic calibration (Calimatic). The buffer set must be selected prior to the first calibration.
Buffer solution	Solution with an exactly defined pH value for calibrating a pH meter.

Calibration	Adjustment of the pH meter to the current sensor characteristics. The asymmetry potential and slope are adjusted. Either a one- or two-point calibration can be carried out. With one-point calibration only the asymmetry potential (zero point) is adjusted.
Calimatic	Automatic buffer recognition. Before the first calibration, the buffer set used must be activated once. The patented Calimatic then automatically recognizes the buffer solutions used during calibration.
CIP	Cleaning In Place – CIP cycles are used for cleaning the process-wetted parts in the process. They are performed for biotech applications, for example. Depending on the application, one or more chemicals are used at temperatures above 70 °C. This extremely stresses the sensors. Digital sensors can release a message after preset number of CIP cycles. This allows replacing the sensor in time.
Combination electrode	Combination of glass and reference electrode in one body.
DLI	Diagnostics function for digital sensors. The "Dynamic Lifetime Indicator", DLI, calculates the expected remaining sensor lifetime based on the sensor load.

GainCheck	Device self-test which runs automatically in the background at fixed intervals. The memory and measured-value transfer are checked. You can also start GainCheck manually in the diagnostics menu. In that case, also a display test will be performed.
ISFET adapter	Adapter between ISFET sensor and transmitter. Here, the signal of the pH-sensitive FET is converted to voltage corresponding to the signal of a glass electrode. This voltage is led to the pH input of the device and is processed further as usual. The adapter is directly supplied from the device.
ISM	Intelligent Sensor Management – ISM sensors have an "electronic datasheet" which allows the storage of additional operating parameters such as calibration date and settings directly in the sensor.
One-point calibration	Calibration with which only the asymmetry potential (zero point) is taken into account. The previous slope value is maintained. Only one buffer solution is required for a one-point calibration.
Passcode	User-defined four-digit number to select certain operating modes.

pH sensor	A pH sensor consists of a glass and a reference electrode. If they are combined in one body, they are referred to as combination electrode. When the sensor has an additional platinum electrode, the oxidation-reduction potential (ORP) can be measured simultaneously with the pH.
Response time	Time from the start of a calibration step to the stabilization of the sensor potential.
Sensocheck	Sensocheck continuously monitors the glass and reference electrodes. The resulting information is indicated by the Sensoface smileys. Sensocheck can be switched off.
Sensoface	Provides information on the sensor condition. The zero point, slope, and response time are evaluated. In addition, the Sensocheck information is indicated.
SIP	Sterilization In Place – CIP cycles are used for sterilizing the process-wetted parts in the process. They are performed for biotech applications, for example. Depending on the application, one or more chemicals are used at temperatures above 115 °C. This extremely stresses the sensors. Digital sensors can release a message after preset number of SIP cycles. This allows replacing the sensor in time.

Slope	Is indicated in % of the theoretical slope (59.2 mV/pH at 25 °C). The sensor slope is different for each sensor and changes with age and wear.
TAN	Transaction number for releasing an additional function.
TTM, Time To Maintenance	Adaptive maintenance timer. The TTM interval is either read automatically from the sensor settings or can be specified manually. After expiration of the interval, the adaptive maintenance timer issues a Sensoface message to remind you to service the sensor Stressing influences (temperature, measurement in extreme ranges) shorten the timer interval.
Two-point calibration	Calibration with which the asymmetry potential (zero point) and slope are determined. Two buffer solutions are required for two-point calibration.
Zero adjustment	Basic adjustment of the ISFET sensor to ensure reliable Sensoface information.
Zero point	See asymmetry potential

21-mA output signal in HOLD mode 41
22-mA output signal during failure 148

A
Access codes: Electronic Signature 154
Access codes: Table 172
Accessories 124
ACT (adaptive cal timer, ISM sensors) 60
Adaptive calibration timer: Configuration 60
Adaptive calibration timer: Description 59
Adaptive maintenance timer: Configuration 62
Adaptive maintenance timer: Description 63
Adaptive maintenance timer: Reset 120
Alarm and HOLD messages 43
Alarm: Delay 88
Alarm: Failure alarm 146
Alarm: Flow monitoring via the CONTROL input 90
Alarm: Operating mode 42
Alarm: Sensocheck 88
Ambulance TAN 121
Application in hazardous locations 17
Application: Mark rating plate 11
Approvals: Application in hazardous locations 11
Approvals: Explosion protection, rating plate 11
Approvals: Explosion protection, specifications 130
Assembly: Enclosure 7
Assembly: Panel mounting 16
Assembly: Pipe mounting 15
Assembly: Wall mounting 13
Asymmetry potential 107
Audit Trail: Explanation 154
Audit Trail: View entries 117
Autoclaving counter, ISM sensor: Description 69
Autoclaving counter: Configuration 68
Autoclaving counter: Incrementing 120
Automatic calibration (Calimatic) 102

B
Backlight colors 37
Buffer tables 133

C
Calibration 98
Calibration cycle 59
Calibration data 115
Calibration mode (configuration) 56
Calibration mode selection 99
Calibration timer: Cconfiguration 58
Calibration timer: Sensoface indication 152
Calibration: Automatic calibration (Calimatic) 102
Calibration: Calibration error 146
Calibration: Data entry of premeasured sensors 106
Calibration: Explanation 38
Calibration: ISFET sensors 98
Calibration: Manual calibration with buffer entry 104
Calibration: Product calibration (pH) 108
Calibration: Redox calibration (ORP) 110
Calibration: Temp probe adjustment 112
Calibration: Zero adjustment 101
Calimatic: Automatic calibration 102
CD-ROM 3
CIP (cleaning cycles, ISM sensor) 67
CIP (cleaning cycles, standard or ISFET sensor) 65
Cleaning cycles, ISM sensor: Configuration 66
Cleaning cycles, standard or ISFET sensors: Configuration 64
Colors in display 37
Compensation, temperature 80
Compulsory marking 11
Configuration: Alarm 88
Configuration: Calibration mode 56
Configuration: Calibration timer 58
Configuration: CIP/SIP settings 66
Configuration: CONTROL input 84
Configuration: Current output 1 70
Configuration: Current output 2 78
Configuration: Explanation 38

Configuration: Individual data, buffer set (for copy) 145
Configuration: Individual data, original for copy 52
Configuration: ISM sensor 60
Configuration: Menu groups 45
Configuration: Menu structure 44
Configuration: Output current during Error and HOLD 74
Configuration: Overview 47
Configuration: Sensocheck 88
Configuration: Sensor 54
Configuration: Tag number 92
Configuration: Temperature 54
Configuration: Temperature compensation 80
Configuration: Time and date 92
Connection to supply units 123
CONTROL input 43
Control inputs: CONTROL 84
Control inputs: HOLD 42
Control inputs: Overview 9
Control inputs: Temperature compensation 82
CONTROL: Floating relay input 84
CONTROL: Flow measurement 43
CONTROL: Parameter set selection 84
Converting slope to mV 107
Current output 1 (configuration) 70
Current output 2 (configuration) 78

D

Data entry of premeasured sensors 106
Data logger: Explanation 8
Data logger: View entries 117
Date and time: Display 113
Date and time: Usage 93
Delay for alarm 88
Device self-test 116
Device type: Display 118
Diagnostics functions 38
Diagnostics mode 114
Diagnostics: Calibration data 115
Diagnostics: Device self-test 116

Diagnostics: Hardware and software version 118
Diagnostics: Logbook 117
Diagnostics: Sensor data 115
Diagnostics: Sensor monitor, measured values 118
Digital sensors: Operation and connection 94
Digital sensors: Sensor type selection 55
Dimensions 14
Display backlighting 37
Display measured values (sensor monitor) 118
Display test 116
Display: Active parameter set (A or B) in display 34
Display: Parameter set A/B 113
Display: Select main display 36
Display: Symbols and colors 33
Display: Time and date 113
Disposal 2
Documentation: Package contents 3

E

EEPROM test, device self-test 116
Einsatzart, Typschilder 18
Electrical installation 17
Electronic Signature 154
Enclosure components 13
Enclosure: Mounting possibilities 7
Entering values 35
Error handling 146
Error messages 147
Error messages (error codes) 147
Explosion protection 130
Extended logbook: Explanations 154
Extended logbook: Via TAN 117
External temp measurement 82

F

FACE: Sensoface alert, 22-mA output current 75
FAIL: Error message, 22-mA output current 75
FDA 21 CFR Part 11: Requirements 154
FIX: Output signal in HOLD mode 41

FLASH test 116
FLOW 87
Flow measurement 86
Flow measurement: Generate message 43

G
Glossary 155

H
HART: Application examples 150
Hazardous locations: Notes for installation 11
HOLD mode 41
HOLD: Description 41
HOLD: Exit 41
HOLD: External activation 42
HOLD: Manual activation 42
HOLD: Output signal response 41
HOLD: Output signal, explanation 41

I
Incorrect use 10
Individual configuration data 52
Info text 147
Installation: Hazardous locations 11
Installation: Memosens 7
Installation: Notes 17
Installation: Safety information 11
Installation: Terminal assignments 18
Intended use 7
IrDA communication: Activating 121
IrDA: Possible errors 146
IrDA: Specifications 128
IrDA: Transceiver 32
ISFET sensors 98
ISM sensors: CIP/SIP settings 66
ISM sensors: Configure adaptive cal timer 60
ISM sensors: Configure adaptive maintenance timer 62
ISM sensors: Configure autoclaving counter 68

K
Keypad 32

L
LAST: Output signal in HOLD mode 41
Likely misuse 10
Linear temperature compensation 81
Logbook 117
Loss of Service passcode 121

M
Manual calibration with buffer entry 104
meas: Key for function activation (see Measurement) 34
Measured values: Display 118
Measurement 113
Measurement: Operating mode 34
Measuring mode: Changing the display 36
Measuring task: pH/ORP, temperatur, glass impedance (examples) 21
Measuring tasks, wiring examples with cables and sensrors 21
Memosens sensors: Calibration and maintenance in the lab 94
Memosens sensors: Configure device 95
Memosens: Connection 96
Memosens: Ex wiring 11
Memosens: Installation 7
MemoSuite: Software for calibrating Memosens sensors 94
Menu groups (configuration) 45
Menu structure (general) 39
Menu structure (configuration) 44
Message via CONTROL input 43
Module test 116
Mounting plan, device assembly and dimensions 14

N
Notes for installation in hazardous locations 11

O
Operating mode selection 35
Operating modes 38
Operating states 122

Options: Enabling via TAN 121
Options: Overview of TAN options 124
Order code 124
ORP calibration 110
Output current 1 (configuration) 70
Output current 2 (configuration) 78
Output current for error message (FAIL) 75
Output current for Sensoface (FACE) 75
Output filter 72
Output signal during HOLD 41
Output signal during HOLD (configuration) 77
Overview of parameter sets 45
Overview: Configuration 47
Overview: Device characteristics 7
Overview: Terminal assignments 12

P

Package contents: Complete 13
Package contents: Documentation 3
Panel mounting 16
Parameter errors 146
Parameter set A/B: Configure external switching 84
Parameter set A/B: Display 113
Parameter set A/B: External switchover 45
Parameter set A/B: Individual configuration data 52
Parameter set A/B: Introduction 8
Parameter set A/B: Manual switchover 46
Parameter set A/B: Menu groups 45
Passcode, configuring 121
Passcodes (electronic signature) 154
Passcodes, table 172
Pfaudler sensors, connection 30
Pfaudler sensors, description and specifications 51
Pipe mounting 15
Point of measurement (TAG) 93
Power supply units 123
Predictive maintenance (Memosens) 95
Presetting pH calibration 99

Process variable for current output 1 71
Process variable for current output 2 79
Product calibration 108
Product line 124
Protective hood 15

R
RAM test 116
Rating plates 18
Redox calibration 110
Registered trademarks 171
Release of options 121
Reset to factory settings 121
Return of products 2

S
Safety information 10
Safety instructions, separate booklet 3
Selection menu 35
Sensocheck: Activating 88
Sensocheck: Configuration 89
Sensocheck: Meaning of icons 151
Sensoface alerts 75
Sensoface: Cause for error message 146
Sensoface: Meaning of icons 151
Sensor configuration 54
Sensor connection 19
Sensor connection (examples) 21
Sensor data: Display 115
Sensor defect 152
Sensor monitor: Display measured values 118
Sensor monitor: Service mode 120
Sensor type selection 54
Sensor wear: Sensoface indication 153
Sensors with zero point other than pH 7 98
Serial number: Display 118
Service mode 119
Service passcode lost 121
Service: Factory settings 121

Service: Increment autoclaving counter 120
Service: IrDA communication 121
Service: Options, enabling via TAN 121
Service: Passcodes 121
Service: Reset TTM interval 120
Service: Sensor monitor 120
Service: Specify output current value 120
Signal colors 37
Signal outputs 9
Signal response in HOLD mode 41
SIP, sterilization cycles, ISM sensor 67
SIP, sterilization cycles, standard or ISFET sensor 65
Software version: Display 118
Solution Ground and Memosens 94
Specifications 125
Standard display, configuring 36
Start-up 10
Sterilization cycles, ISM sensor: Configuration 66
Sterilization cycles, standard or ISFET sensor 64

T

TAG 93
TAN options: Enabling 121
TAN options: Required codes 124
TC table 81
Technical terms 155
Temp probe adjustment 112
Temperature compensation 80
Temperature compensation: Table 81
Temperature dependence 110
Temperature detection: Calibration 57
Temperature detection: Temp specification via current input 55
Temperature detector: Adjustment 112
Temperature detector: Select type 54
Terminal assignments 18
Terminals: Properties 11
Terminals: Schematic overview 12
Terminals: Terminal assignments 18

Time and date (configuration) 92
Time averaging filter 73
Time: Display 113
Trademarks 171
Transaction number 121
Transceiver (IrDA): Location 32
Transceiver (IrDA): Specifications 128
TTM: Configure adaptive maintenance timer 62
TTM: Reset 120

U
User interface 32

W
Warranty 2
Weather protector 15
Wiring 19
Wiring examples, sensor connection 21
Wiring: Power supply units 123
Wiring: Sensor connection 19
Wiring: Sensor connection (examples) 21

Z
Zero adjustment (ISFET) 100

Trademarks

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Sensoface®
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Memosens® is a registered trademark of Endress+Hauser Conducta GmbH and Knick Elektronische Messgeräte GmbH & Co. KG.
HART® is a registered trademark of the HART Communication Foundation.

Passcodes

In the SERVICE – CODES menu you can assign passcodes to protect the access to certain functions.

Mode of operation	Passcode
Service (SERVICE)	**5555**
Diagnostics (DIAG)	
HOLD mode	
Calibration (CAL)	
Configuration (CONF)	

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